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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Eighteenth Annual Meeting, Ohio Gas Light Association.

OFFICE OF THE SECRETARY,
DELAWARE, O., Feb. 18th, 1902.

The Eighteenth Annual Meeting of the Ohio Gas Light Association will be held at Columbus, O., March 19th and 20th, 1902.

The President, Mr. Henry L. Doherty, of Denver, Col., will call the meeting to order, on Wednesday, March 19th, at 9:30 A.M., in Convention Hall at the Great Southern Hotel, the headquarters.

The Executive Committee have made a radical departure from the usual programme custom, in that no formal papers will be presented; but the following subjects will be offered for discussion, written opinions having already been submitted by several prominent men in the profession:

"Equity, Legality and Advisability of Charging Different Rates for Illuminating and Fuel Gas."

"Distribution of Gas at High Pressure."

"Future of the Gas Business."

"Is There Any Economy in a Full-Depth Bench over a Half-Depth; and Why?"

"Can Iron Meter Connections be Used to Better Advantage than Lead?"

"Are Loose-leaf Ledgers Desirable for Gas Company Records?"

"How May Complaints be Best Cared for?"

"Should an Individual Pressure Regulator be Used on Every Meter?"

"Recent Developments in By-product Coke Ovens."

"Recent Developments in Inclined Retorts."

"Coke Handling."

"Isolated Generator Firing of Benches."

"Domestic Water Heaters."

"State Regulation of Quasi-public Corporations."

"The Best Way to Extend Gas Mains into New Suburban Territory or New Additions; and the Best Way to Reinforce Insufficient Pressure in a Certain Section of a City."

"Wrinkle Department;" edited by Mr. E. E. Eysenbach, of Columbus, O.

"Novelty Advertising Department;" edited by Mr. B. W. Perkins, of South Bend, Ind.

The Question Box, which is always an interesting feature, will be given special consideration. Each member is requested to make contributions for this, and send them to the Secretary not later than March 8th, so that they may be printed.

An opportunity will be given all of the speakers at the meeting to correct their remarks before leaving Columbus, but not later, as all the reports will be turned over to the printers immediately after the adjournment of the meeting.

The Great Southern is conducted on the American and European plans, and the following rates have been secured for the meeting: American plan, $2.50 to $4 per day; European plan, $1 to $2.50 per day. The Southern hopes to entertain all of the Association, and will put forth every effort to make the members comfortable. The most satisfactory quarters are always obtained by writing in advance to the hotel people.

The Secretary will furnish with pleasure application blanks for membership, and any further information which may be desired relative to the meeting.

T. C. JONES, Sec'y.

[OFFICIAL NOTICE.]

Fourth Annual Meeting, Southwestern Gas, Electric and Street Railway Association.

SOUTHWESTERN GAS, ELECTRIC AND STREET RAILWAY ASSOCIATION,
OFFICE OF THE SECRETARY,
WACO, TEX., Feb. 8th, 1902.

The Fourth Annual Meeting of the Southwestern Gas, Electric and Street Railway Association will be held in San Antonio, Tex., on the 18th to the 21st of April, 1902. As the membership is alive with interest, both on account of the place selected to meet and the good results to be obtained, a successful meeting is therefore assured. The headquarters and programme in detail will be announced later.

T. H. STUART, Sec'y.

[OFFICIAL NOTICE.]

Wrinkle Department, Western Gas Association.

WESTERN GAS ASSOCIATION,
OFFICE OF WRINKLE DEPARTMENT.
BELLEVILLE, ILLS., February 12th, 1902.

This department is now open and ready for contributions, which will be presented at the Twenty-fifth Annual Meeting to be held next May. The active co-operation of all members and friends is earnestly solicited. Please forward contributions to the Editor before April 15th.

W. E. STEINWEDELL, Editor.

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BRIEFLY TOLD.

THE NEXT MEETING OF THE OHIO GAS LIGHT ASSOCIATION.—Secretary Jones, in his official notice respecting the 18th annual meeting of the Ohio Gas Light Association, explicitly explains that which is to be done in connection therewith at Columbus, O., next week. The meeting days are the 19th and 20th of the month, and headquarters and assembly room are under one roof—that of the Great Southern Hotel, which hospitable and satisfactory house can be certainly counted on to take the best of care of the Association and its guests. Of course, it is held as granted that, as Secretary Jones pointedly suggests, "The most satisfactory quarters are always obtained by writing in advance to the hotel people." The entertainment programme is not entirely completed, but it is quite safe to say that when the numbers thereon have been tested, the participants in the hospitality of the committee will agree that all was well. The technical programme, so far as the similar practice of the Ohio and other Associations is concerned, is a novel one, in that no formal papers are to be presented, unless the address by the Association's President (Mr. Henry L. Doherty, of the Denver Gas and Electric Company) shall be so considered. The Executive Committee of the Association, undoubtedly prompted by the arguments of President Doherty, determined that it would be the part of wisdom to name several topics for general discussion that would have much of interest for the profession. The further understanding was that, the topics having been named in advance, written opinions thereon would be submitted by those competent to speak understandingly regarding them. If the list of topics named by the Secretary may be taken as an indicator of how long the sessions are to last, there will be lengthy technical sessions in Columbus next week, especially when it is remembered that the "Topics" are to be followed by "Wrinkle" and "Novelty Advertising" departments, and a Question Box debate. The scheme is certainly an original one, and promises much in the line of good technical work. A part of the outing programme is an invitation, extended to the Association by the Columbus Gas Companies, to visit the famous natural gas fields of the Sugar Grove district, some 30 miles south of Columbus, the great pumping stations of which are well worth a visit from any practical gas man. Every indication is that the Ohio's 18th meeting will be a good one.

CHANGE OF MEETING PLACE, WESTERN GAS ASSOCIATION.—It is hardly necessary at this time to make further notice, than that given in the JOURNAL for last week, through the official announcement of Secretary Dunbar, that the members of the Western Gas Association, by mail vote, had decided to substitute New Orleans, La., for Indianapolis, Ind., as the place for holding its next annual meeting. The vote was so overwhelmingly in favor of the change—New Orleans, 189; Indianapolis, 63; neutral 12—that cavilers perforce must acquiesce, and such silence is further enforced by the fact that President Miller, Second Vice-President Shelton and Secretary Dunbar were agreed over the policy of substitution. We are also assured that Mr. James Somerville, of Indianapolis, at whose invitation the Association agreed last year to name that city as the year's meeting place, was not *altogether* adverse to the substitution. In the light of such official uniformity, taken together with the sentiment shown in the voting, objections count but little; but it might be fair to hope that, when the meeting is held in New Orleans, the work of the committee to name the next place of meeting will not have to be undone between times. No one, of course, doubts the sincerity and heartiness of the invitation extended to the Association by the New Orleans Lighting Company, nor can there be any other thought than that the meeting will be a success; and as "a large majority" ruled that the move should be made, it is up to us all to go on with the good work which the Western Gas Association has always performed.

NOTES.—Through the courtesy of Mr. Jno. J. Gribbel, of Messrs. John J. Griffin & Company, of Philadelphia, we are in receipt of a copy of a well-put together pamphlet that is mainly devoted to an intelligible and complete description of the value and use of the prepayment meter. It seems to be the fashion just now to make little of this device, but our own belief is that, much as has been done in the past with the prepayment meter as a means of extending the use of gas in odd places, the future will make a still better practical showing for it. ——Ald. Sullivan, of the New York Board, last week introduced an ordinance which declares that the price of gas in the boroughs of Manhattan, Brooklyn and the Bronx shall not exceed 75 cents per 1,000 cubic feet. The measure was referred to the committee on gas, water and electricity, from whence it is not likely to be reported. The State is presumed to have jurisdiction in such premises, remembering that the charter of the companies emanated therefrom.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.—Continued from Page 302.]

PROCEEDINGS, THIRTY-SECOND ANNUAL MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

HELD AT THE PARKER HOUSE, BOSTON, FEB. 19 AND 20, 1902.

FIRST DAY, FEB. 19.—MORNING SESSION.

The President called upon Mr. C. S. Griswold, of Meriden, Conn., to read his paper on

HOUSE PIPING.

[For the text of Mr. Griswold's paper, see JOURNAL, Feb. 24; page 261.]

Discussion.

The President—Gentlemen, Mr. Griswold's paper is before you for discussion.

Mr. Gould—I would like to ask Mr. Griswold if they ever lay a new main to supply a lot of houses which require piping in this manner, or if they simply take houses along their present mains.

Mr. Griswold—Houses that are to be piped, where such are along the mains, are always attended to, but to pipe a house at a short distance we should hardly lay a main.

Mr. J. A. Coffin—This is a practice that we have been engaged in some 20 odd years. We have done about 90 per cent. of the piping, both old and new, in house and fixture business, and have practically done it at cost, quite often at a loss. I think, taking the whole business, we have come out about whole. Perhaps we have made a few dollars on some houses under favorable conditions; but we never thought of setting the meter at an increased rate. I can see readily that it would add quite a lot of business, perhaps, to our present trading. People who pay from time to time would realize and pay for it. But we of Massachusetts have to conform to most all Boston ideas, and in Boston they don't allow galvanized fittings, for the same reason that this gentleman gives for using them—about the sand holes. The Commissioners in Boston claim that as sand hole fittings can be galvanized so as to stop up the sand holes, and as such are not very durable, they don't allow any galvanized fitting to be used in Boston. About how much do you add per 1,000 feet of gas?

Mr. Griswold—13½ cents.

Mr. Anderson—One idea expressed I favor very much; that is, in relation to using T's instead of L's. It has been my experience that the use of L's has been a source of a great deal of trouble, for the very reason given by Mr. Griswold, and I have instructed my fitters for years not to use an L where they could use a T; in fact, to use an L only in places where it was, owing to situation, useful to take out the plug.

Mr. F. W. Humphreys—Our experience at New Haven, being quite different from that at Meriden, may be of interest to some of the members. We started about September and did the thing entirely through the local plumbers. We piped the houses, 4 rooms for $15, and added $2 an opening for each opening thereafter. They charge us $2.50 an opening, 4 rooms $10, and the $5 additional covers the cost of fixtures and hanging. We piped up about 230 houses, and gave the people about 3 months' time in which to pay, taking payment at 30, 60 and 90 days. Of course, the feeling between the plumbers and ourselves is very good. We did not have any trouble in starting the thing. We carried it along rather slowly for the first year, feeling our way somewhat; but as it stands to-day I think we will do double the business this coming season than we did last year. Our prices will be just a little higher. We are to adopt a different scheme. We will charge $2.50 an opening for the pipe and add the cost of the fixtures, giving the consumers the choice of whatever fixtures they may want. If they want a very good fixture they can have it; if they want a cheap one they can have it; and there will be no complication in prices. Under the old way we carried two sets of fixtures and a few samples of other or better fixtures, and the trouble was that people would want a set of fixtures not the regular sort, which confused the prices, and we found there were some few errors in the charges to the consumer. But with the method that we will adopt this year, of charging $2.50 an opening, and then adding the cost of whatever fixtures they pick, I think we have a very satisfactory arrangement, and that we will do probably just as much business at a slightly increased price. The indications are that we ought to do a good business this year. The canvassers did not devote their entire energy to that one thing, but worked it in with the stove placing. We will do the same thing this year, canvassing the stoves and the house piping together at the one time.

The President—How many companies do house piping? Let us have a show of hands. (17 assented.) Mr. Coggeshall, do you pipe houses?

Mr. Coggeshall—We do. We are novices in it, having entered upon it this winter. We have been very successful. We employ the men that we had on stoves in the summer during the winter season for piping.

Mr. Nute—We have graduated from the condition of doing house piping ourselves, although we did it for quite a number of years, and got a large number of consumers in consequence of the practice. We are now to the point where we do not need to do it. I think we must have an unusually good set of gasfitters in our town, for they do it cheaper than we can ourselves. To show that they are doing some of it, I will say that they are piping about 1,000 old tenements a year in Fall River. They are doing it at a price of $2 an outlet where there are as many as 4 or 5 outlets on one riser; where there are 6, 8 or 10, they very frequently and very generally reduce that price somewhat. They are willing to give the canvassers hired by the Gas Company a commission of 5 per cent. on the business they bring to them of piping, in addition to doing this piping at these low figures.

Mr. Shelton—Does that include fixtures?

Mr. Nute—No fixtures.

Mr. Campbell—May I ask if that is not conducive to competition and poor work on the part of the plumbers? That is, don't they cut rates and make up for it by doing poor work?

Mr. Nute—I would like to say we get the very best work. All piping is inspected by the Gas Company, and is not passed until it is in accordance with our rules.

Mr. Scranton—Do you sell the fixtures, or do the plumbers?

Mr. Nute—The plumbers generally; we do not sell any.

Mr. Scranton—Do they sell them at the regular list price?

Mr. Nute—There is very sharp competition on the question of fixtures. The party who does the piping very frequently does not sell the fixtures.

The President—At this point I propose to present one of the questions in the Question Box that bears on this subject.

Mr. Allyn—Mr. President, before you do so I would like to move a vote of thanks to Mr. Griswold for his very practical and interesting paper. [Adopted.]

The President—It was not my intention to stifle the discussion, but I thought that this question in regard to pipe fitters might be brought up and discussed at the present time, so that if any of you other gentlemen have anything to say in regard to house piping you can do so later. The question is:

> "Has the licensing of gasfitters proved a benefit to the Gas Companies in Boston? And would the Boston Companies recommend the passage of a State law requiring gasfitters to be licensed?"

Mr. Addicks, I think that is up to you.

Mr. Addicks—I am very glad to respond, Mr. President. I think on the whole the licensing of gasfitters has proved a benefit to Boston. To be sure there have been some hitches, as there always will be in any new departure of this kind; but I think on the whole that the people get better served than they ever did before, and that, without the friction as between them and the Gas Company, in that respect for the city authority is greater than that which the Gas Company will excite. Particularly is this true in relation to fixtures. They are now invariably put up in tight condition. They have to stand a pressure to which they were not subjected in the past—I am referring now to the test. The test for the house piping is similar to that which was used in the past by the Gas Company. I would say that the Gas Company inspects the piping in the same manner as it did before the city had anything to do with the testing, and on this theory that, even although work is passed by the city, it is perhaps wiser for the Company to have its own inspectors observe the test as a protection to the Company. There have been some objections, I think, in that in the rules established by the department having charge of this, or the Commission, if I may use that word, have been made without consulting the Gas Company in regard to the provisions that should be put in. So far as it relates to the construction of a building that seems to me perfectly proper, but when it comes to providing that all gas piping used in the piping of the building must be extra heavy pipe seems somewhat unnecessary. Probably they must have heard of Mr. Shelton and his high pressure system, and thought it would require especially strong pipe. However, that only lived in the specifications for a short length of time, but it was in print for that time. Again, they provided that the pipe should be inclosed in tar, to prevent corrosion under the floors. That was brought about by a practice in fireproof construction. I don't know whether it is being done in practice now or not, but in order to produce light floors the architects of Boston in order to have a minimum floor load got in the habit of using ashes with cement for forming the floor above the terra cotta arches. While I don't approve altogether of using ashes around pipes, we sold large quantities from the North End for that purpose—as long as they have to be sold I suppose we might as well sell them—but I pointed out that, if they were endeavoring to avoid corrosion and leaks of gas in pipes by use of tar, a short circuit of electricity coming in contact with those pipes would produce gas from the exterior of the pipe being in contact with this tarry compound. We have so many illustrations of that in practice on the streets of Boston that it at once was apparent and was abandoned, not only for that reason but for others. On the whole, I think the inspection department has been a wise provision. I do not know that I would recommend it for a small town, as it might be unnecessary, but when you come to a very large city, and difficulties multiply in all directions, on the whole, I think it has proved beneficial, and I think if I were asked whether I should be in favor of continuing or abandoning it I should vote in favor of continuing it.

Mr. Macmun—We adopted the house piping system some 10 years ago, for various reasons. The first was that the plumbers' price for piping was so high that it barred the owners from calling for the work. Secondly, we found there was a small margin of profit in it for our Company. Utilizing my spare time, I started house piping. Since that time we have piped about all the house, have done all the gas piping in the city, and find we derive quite a benefit from the practice, which you may see by our output to day as compared with that of 10 years ago.

Mr. Addicks—In connection with the house inspection the plumbers are licensed, but there is an especial provision in the law which provides that the Company's employees are not required to be licensed. The licensed men have to take an examination, and I have required that our men before reaching the highest grade of jobbers shall produce a fitter's license. I think it has made men study a little more and be a little more wideawake. I would also remark in connection with this law that no meter can be disconnected in the house of a consumer without its being done by the authorized agent of the Gas Company. That prevents the indiscriminate moving of meters for test by the various gas saving devices and testing devices that we have had in the past year, and is also quite useful in the competitive districts.

Mr. Anderson—I would like to ask Mr. Addicks his opinion in relation to the law given by the Commission that meters shall have straightway valves at the inlets and outlets, or whether the old stopcock would not be the proper thing.

Mr. Addicks—Mr. Anderson has touched upon one of the points I raised, which is that these gentleman have established rules without consulting the gas companies as to what they require. I don't know that I am fully prepared to-day to either advocate or oppose the use of valves as against the stopcock. One very grave objection, which caused the death of two men, I think, in Boston, is that when house piping is connected up with a stopcock in the usual way near the surface of the foundation wall, and that stopcock became defective, or leaky, or in a bad condition, or the head was broken off by the use of a wrench, that in replacing it with a valve of course it was necessary to take the valve stem out. When it was unscrewed from the body of the valve they either attempted to close the opening with waste or with soap, with the result that they had a large quantity of gas on, which ordinarily they would not have had with a stopcock, because the stopcock would turn in the space between the pipe and the walls without difficulty; I mean the stopcock with its stem in place and the stopcock closed. To obviate that, so far as our own Company is concerned, which is doing work of that description, I have had made a cover for the valve, so that when the stem is taken out the cover will go in place, and to all outward appearance the valve looks like an ordinary horizontal, side-swinging, check valve. After the valve is screwed in place the cover can be taken off, the valve plug remaining in place, and the stem can be put in place and the valve adjusted without having any gas on, no more than when the stopcock is used. So far as the use of the second valve on the meter is concerned, I think it is utterly useless. The purpose of it I understood was the easy testing of the house pipe by putting a pressure on to the valve, but I think the chances are that the valves used by a great many gasfitters are inferior, and in order to test the pipes they have to put a plug in the end of the valve. Thus the valve is useless.

Mr. Anderson—Mr. President, the reason I asked that question was that we have had some little trouble with the valve system which has been put in. For instance, we had a notification of a leak a short time ago in a house where some Italians resided. I sent a man to look it up and

he found that some person had turned one of the valves. The inlet to the meter had been removed, and the valve on the service pipe near the floor was turned on. They claimed it made them sick. Consequently they put in a claim to the Company. Another valve placed near the entrance to the cellar was covered with coal, and that valve was turned on. When we dug down to get that main valve, to see why it was not shut off, we found the stem so badly bent that that also was leaking. And we found two or three cases where valve stems had been bent by coal being piled upon them. We have that sort of trouble. It is so easy for children to turn on stopcocks and cause leaks, etc., that we are held responsible for, that I think they should be removed and we should go back to the old system.

The President—I think I will read for your edification some of the building laws of the city of Boston:

"There shall be a brass straightway valve on the service pipe close to the foundation wall, one at the inlet and one at the outlet side of each meter. Iron valves shall not be used.

"Brass solder nipples shall be used on all meter connections.

"Galvanized fittings are prohibited.

"All service pipes in cold or damp places shall be painted with two coats of red lead and boiled oil."

Perhaps, as a matter of record, it might be well to read the house piping scale of the city of Boston. Instead of reading it, though, I will hand it to the stenographer, and at the same time I will hand him the schedule or scale as used by the city of Hartford, Conn. Any further remarks?

The scale in use in Boston, referred to by the President, is as follows:

Iron Pipe.	Length Allowed.	No. Burners.
⅜ inch	26 feet	3
½ "	30 "	6
¾ "	50 "	20
1 "	70 "	35
1¼ inches	100 "	60
1½ "	150 "	100
2 "	200 "	200
2½ "	300 "	300
3 "	450 "	450
3½ "	500 "	600
4 "	600 "	750

Schedules of lengths and sizes of tubing with number of burners adopted by the Hartford City Gas Light Company, to be followed by gasfitters in the piping of buildings for gas in the City of Hartford:

The schedule used in Hartford is as follows:

Size of Pipe.	Length Allowed.	No. of Burners.
½ inch	20 feet	6
¾ "	30 "	15
1 "	50 "	20
1¼ "	75 "	40
1½ "	120 "	60
2 "	160 "	100

Mr. Harbison—Mr. President, I would like to say a word regarding the Hartford scale. We are discussing here one of the practical questions in the supply of gas for illumination, domestic, and manufacturing purposes, and I know of none more important, after the gas company has done its duty by furnishing at the meter a sufficient supply of good gas at a reasonable price, than that of the service beyond the meter, generally understood as house piping. As the brethren all know, as the price charged for gas is reduced its use becomes more general, and the piping put in years ago is found to be very deficient, because of the scale so-called of sizes used. In every town and city supplied with gas throughout the country the experience has been that the consumption of gas has been gradually increased after the price has been reduced, its use becoming more general for all the uses to which gas can be put. This subject of house piping has been under discussion by the various Associations of our industry at many times, and various Associations have adopted "scales" for house piping. While generally agreeing with the advancement made by Associations in this line, the Hartford Company has singled itself out and made one step we think in advance of any action of any Association on this line, and hence in 1900 we reaffirmed what had been sent out some years previous to the gasfitters of Hartford. At this point permit me to say, Mr. President, that the Gas Company of Hartford has never done any house piping, and, notwithstanding the experience of our friends in Meriden, whom we greatly esteem for their progressive course, and others who do such piping, we have not thought it advisable to do it in Hartford. I may say in that connection, that with us the Plumbers' and Gasfitters' Union take care of that matter pretty generally. They have such a union, and no man can become a member of that union until he he has passed an examination by a board selected by the union, who are experts, and shows that he is capable to do the kind of work required, and he has his license as having passed that expert examination. When he has done his work it is always compulsory that he shall have it inspected by a representative of the Gas Company, as to the size and lengths of pipe and proper construction of the work. Now, sir, in 1900 we issued in a sort of advisory way to the gasfitters, a schedule of lengths and sizes of tubing, with numbers of burners, adopted not by the gasfitters, but by the Hartford City Gas Light Company, to be followed by gasfitters in the piping of buildings for gas in Hartford; and that not only means the city of Hartford, but the adjoining towns which the Hartford City Gas Light Company supplies outside of the city limits. The card is in your hands. I will read it, and later on it will be published in the AMERICAN GAS LIGHT JOURNAL.

Having read the card regulations, Mr. Harbison continued:

We sent one of these cards to every gasfitting house in Hartford, taking their receipt for it so that they could not say they had not the information necessary to get their job inspected. I want to say in this connection, Mr. President, that the Hartford Company has not in certainly 15 years tapped anything smaller than a 1¼-inch hole in a gas main. We do not buy less than 1¼-inch pipe. We have taken up during the past half dozen years, when Hartford began to put down what is called improved, asphalt paved streets, a matter of several miles of 3-inch pipe that was laid 40 to 50 years ago, the works having been in operation since 1849, and we are using that pipe almost exclusively for service pipes—3-inch cast iron main. The trouble in our experience with permitting a ⅜-inch pipe to be put in any room in any house, is that at certain seasons of the year, when the weather is cool, parties want to put in a radiator. They take off the bracket on the wall, put on the fittings, leave an outlet for the radiator, and want to put back the bracket, and there is not gas enough to supply both. If there was a ½-inch pipe it would supply both. There is the difficulty which you will run against, gentlemen, all the time as the price of gas comes down. Our experience, perhaps, has been in advance of most of the members of this Association, and because our selling price for gas has been much below the large majority of other gas companies, and our demand for gas has been in proportion to the reduced rate at which we are selling. That will be your experience. We have not found it necessary or thought it desirable to do any house piping. We hold the gasfitters or plumbers responsible for the way in which they do their work, and we do not care to interfere with them by doing the work ourselves. We require all new work to be inspected. But, Mr. President, there is a pretty serious feature connected with our business, which I wish each one of you would take right home and think over; namely, that as you reduce your price of gas and it becomes more general in use, you find that people who want an extension of piping to parts of the building not heretofore piped get a gasfitter to come in and make it. We don't always get that job inspected, and there comes in a large element of danger by imperfect work and of possible responsibility to the Gas Company. Now, we do not advise the people of Hartford to use gas as an invigorator to health or to inhale it with regularity, or anything of that kind, and yet occasionally somebody will do it. I have not known of a case in my limited experience where a party has undertaken to do that, either by leaving a burner open or by having an imperfect pipe or a fitting in these extensions, but it has been heard from afterwards. I don't believe that any of us are making a gas and sending it out to customers but that a certain quantity of it if properly inhaled will have a certain effect. We are not all free from that sort of thing. But it has been because of improper use of it, and it has come principally from those two causes, either leaving a burner turned on designedly to reduce a doctor's bill and making the result certain, or else imperfect work on the part of somebody who has extended a pipe without having it inspected. This house piping business is a very important matter. Plenty of men are capable of doing that work. If anybody wants fixtures and comes to us for advice—and there is no commission on this remark, and no chromo expected—we say to them that 18 miles from Hartford, in the city of Meriden, is one of the finest fixture manufacturing companies in the country. We advise them to go there, and they will come and furnish them the fixtures. We don't want to interfere with the business. I agree entirely with our friend Mr. Addicks that a second valve by the meter is wholly unnecessary and should not be there. I agree with the suggestion that T's should be used instead of elbows, and that every means should be adopted and insisted upon by the managers of the gas companies, that every facility should be within easy reach of remedying any obstruc-

tion that may be in the pipe. We use only galvanized pipe for services, and think that it pays to do it, as the slight difference in the cost of the pipe is many times made good by the lasting qualities of it in the ground.

Mr. Addicks—I don't want to take the time of the Association in further discussion of this question, which has been pretty well threshed out, but as long as those two scales are to go in I think I would like to add a word. I am glad the gentleman read his scale. I was a little open in my mind as to what the other scale contained. I feared it might be smaller than the Boston standard, but I see it is larger. I should not like to be required to have all our services 3-inch. I want to call the gentleman's attention, however, to the fact that if he taps a 1¼-inch hole in all his main pipes his average main pipes must be larger than those of many other companies, as ordinarily I don't think he would tap a 3-inch main, or possibly even a 4-inch main, as much as 1¼-inch. But what I wanted to call to his particular attention was this: The difficulty in a large city to-day is the size of the present house pipe; that is to say, the present scale as shown in the requirements of the city inspection department. It is a copy of the old Boston scale, which has been used for years. The pipe is already too large to be used in a modern, tall building. Now, we have to think of that as well. I am glad the gentleman coupled with his explanation the fact that with his ½-inch pipe it is intended to attach a radiator as well as a burner, indicating to a great extent the ordinary household use, and where possibly his pressure may be less than that of some other companies. We find that a ¾ pipe is quite large enough for the purposes he indicates. But when you come to the tall building, with the expanded metal partition, very thin partition, the question of a ½-inch pipe or a ¾ pipe becomes an important thing, and we have lost many buildings simply from that reason alone. To be sure in the large apartment houses, where we lose the house lighting we make it up by having the stoves, because invariably in the latter building we put in risers for gas stoves. I only speak now because if no one else spoke it might appear as though the Association had carefully considered this question of pipe, and that ¾ pipe was too small to be used, and I would not like that impression to be left upon the record.

Mr. Harbison—Mr. President, I simply want to say in reply to my friend that Boston is "the only." It appears that the surface here in proportion to the enumeration is very small, and hence they have to put up very thin partitions, in order not to knock the nap off their good clothes as they turn round in the room. But such conditions do not exist outside of Boston. We have room enough to breathe and to shake hands with our neighbors without putting our elbows out of joint. My experience has been that the continued increase in the use of gas demands a larger pipe to carry the quantity desired. In our 3-inch mains we have no difficulty in tapping a 1¼-inch hole, and I think I have not within my recollection a single case where the main has been injured by tapping a 1¼ hole. If there is a larger size to be put in we cut the main and put in a branch. But in a 4-inch we can connect a 1½-inch, and in a 6-inch a 2-inch, and not hurt the main. We believe in a good, liberal supply. Our average pressure is a fraction over 3 inches, and because of the topographical situation in Hartford it is necessary to give a good supply, and because many years ago the house pipes were too small, much smaller than now permitted. But we find that it pays; it gives the people better satisfaction. They can get all they want and make no complaints. We are situated at the gas works so that we can furnish them all they need, and it is a mutual admiration society throughout. That is the practical working of it.

Mr. Addicks—Mr. President, if I am in order, I move that a committee of three be appointed to report to this Association a scale of house piping, and to include gas engines also. [Seconded by Mr. Harbison.]

The President—You have heard the motion, gentlemen. How will that committee be appointed, Mr. Addicks?

Mr. Addicks—I suggest it be appointed by the Chair, and that the one who made the motion should not be upon the committee.

Mr. Harbison—I agree to everything but the latter remark, Mr. President. No restriction on the President's appointment. [The motion was adopted.]

Mr. John A. Coffin—Mr. President, I think Mr. Harbison's experience in tapping mains is in direct contrast to every other man's experience here present, so much so that, if not adopted by this meeting, there has been a general expression that ¾-inch was the limit for a 3-inch main, and 1-inch for an 8-inch main. We exceeded that limit till within 5 or 10 years, tapping quite often a 3-inch main for an inch street L, a 4-inch main for 1¼-inch, and almost invariably with the most disastrous results; broken mains, when frost was in the ground, getting out in the night and ventilating cellars, and barring for the leak to ventilate the break. My experience is only about half the General's. If one of our men was caught tapping a main above these limits I should call him down.

Mr. Anderson—I would say, Mr. President, I quite agree with Brother Coffin.

Mr. Harbison—Mr. President, there are ever so many men here who agree with Mr. Coffin.

ANOTHER QUESTION.

The President—I am going to ask one more question, after which we will have the pleasure of listening to a short paper by Col. F. S. Richardson, of North Adams, Mass., which I believe is not on the regular list. The question is:

"Can oxygen be made cheap enough to use in oxide purification?"

Who will answer it? Can anybody state how oxygen is made? If not, I will tell you. The air is freed of carbonic acid and moisture and forced through barium oxide in a steel retort under about 15 pounds pressure, the retort being at a very dull, red heat. The oxygen is absorbed, the nitrogen and the balance of the air pass out through the retort by some kind of a safety valve. The retort is then heated up to a bright red heat and put under vacuum, and the oxygen is pumped out of the holder. The barium oxide is then cooled and used over again. As to the cost I know nothing. Col. Richardson, we would be pleased to hear from you, and I say it was at my special request that Col. Richardson wrote this paper.

Col. Richardson—Gentlemen, the President's explanation alone is responsible for this paper. It has no merit at all other than my responding to his request. I was asked to write a short paper on the topic

WHAT IS A GAS COMPANY?

and this is the result:

Aside from the distribution of pure water for all domestic, manufacturing and municipal purposes, it is the most important factor in daily human life, and when we say gas company, let the term include and comprehend the combination plant, for as the purveyors of artificial light they are kindred. In my judgment, and not so much for the benefit of the stockholders as for the good of the public, the law ought to be compulsory that gas and electric supply, in towns and cities under 100,000 inhabitants at least, should be from one, and only one, corporation, and that company under State supervision.

It is generally speaking one of the largest local taxpayers. As such it is a reliable source of income to the town or city, and can always be depended upon as among the first to discharge this obligation. Who does not call to mind at this moment people in his own community who abuse and discredit the local lighting company, and who themselves try each year to evade payment of a poll tax and are never patrons of the company themselves? From such irresponsible sources do most of our unnecessary trials originate.

It is, or ought to be, one of the best customers of local merchants, upon whom they can all depend for full payment of their accounts when due. Would that we could have the same security in the receipt of our bills! It seems a prudent practice in which to indulge, that of buying always when possible of home people, even if costing a trifle more than in the wide market. It is a good investment.

It is usually through dividends paid, a safe source of income to many families, estates and institutions of charity, or learning. What more potent reason is needed for the local lighting company to freely publish, through the mediums of local papers and otherwise, its progressive determination to give lower prices and improved service, and for the public to freely give its patronage, than the knowledge that large portions of its earnings are spent right at home for such deserving needs.

It is in many cases one of the best and most desired clients of banks. Did anyone ever know of a financial institution, or an individual for that matter, sustaining a money loss through legitimate business operations with a gas company honestly conducted? In this light our companies demand most distinguished consideration, and I make bold to assert that the securities of progressive artificial lighting companies, honestly and intelligently managed, properly and decently capitalized, protected as they should be from competition in their natural territories, and under just and rational supervision, must and will be classed as gilt-edged, taking their place with standard railroad stocks and bonds, and rated only next below government, State and municipal bonds. I expect soon to see our securities accepted by various commonwealths as proper and desired investments for savings banks.

It is, in furnishing street illumination, an agent under heavy moral obligation to the welfare, peace and security of every inhabitant of the territory lighted, and under equally heavy expense and risk, yet the

agitation for municipal lighting, disregarding vested rights and investments, would lead the unthinking and uninformed and the misinformed to believe that crisp, new bank bills of large denominations are a residual of Welsbach mantles, and that gold eagles are found in the inner globes of every arc lamp, at stated intervals of 90 or 100 hours, whenever trimmed. But, alas! How different to us who know. Well maintained and properly distributed street illumination is an art, a positive protection to person and property, considered by all to greatly aid the police and by many to be more efficient. In some cases the latter view could be easily sustained.

It is the absolute custodian of more daily personal and household comforts than held by all remaining people or corporations in the community. If a disagreement with this statement is held, let the person realize his condition if deprived of the gas range, radiator, grate and Welsbach burner, or incandescent lights, electric sad iron, arc lamps and electric motors.

Our moral obligation to the hourly welfare of the city, its merchants and institutions, the wife and her household are not to be lightly considered. It is no holiday pastime to manage a local lighting company, and I would cheerfully contribute toward the expense of some political agitator, or an unreasonable faultfinder, or both, being compelled to assume for a year the trials, hard work and heart burnings of some faithful and successful superintendent of a public lighting plant. Some fallacies would be exploded and much criticism cease.

It gives an opportunity for sterling worth to be developed in young men; and who will say 'tis not a blessing to any community for boys to be given a chance, and for them to be led to positions of honor and influence. Our business is a profession. It is really an art. The more that is known of the aims and purposes of the men controlling the artificial light business in various communities—that is, the most of them, for there are exceptions, and they are alone responsible for the odium attached to this industry—the more are they counted true and loyal friends of their city and State. It would truly be a misfortune were the public to lose the services and sustaining influence of its gas company.

Seriously, though, and lastly; it does open the door to honest, progressive men in managing artificial lighting properties to prevent suspicion surrounding the business, to gain the goodwill and confidence of the public—the greatest of all. It compels those in authority to keep their plants in a high degree of modern efficiency, their distribution equal to demands; their offices clean, commodious, well lighted and always open; their employees (all of them) neat, courteous, attentive and truthful; their complaints never neglected or disregarded; their service improved and their prices at the lowest point commensurate with proper operation, good return upon money invested, and a safe surplus for contingencies and disaster. Nor do I hesitate in declaring that where such practices prevail business will flourish, and the public will meet you heartily more than half way, saying—what is true—"Well done, good and faithful servant."

Mr. Addicks—Mr. President, I move a vote of thanks to Col. Richardson for his paper. I wish to cover also thanks for the fact that the President asked him to write a paper. [Seconded by Mr. Anderson and adopted.]

The President—I also personally thank you, Col. Richardson. I will make the following

APPOINTMENT OF COMMITTEES ON OBITUARY RESOLUTIONS.

On the Death of Mr. F. C. Blood.—Messrs. S. J. Fowler, J. J. Humphreys, Jr., and Z. M. Jenks.

On the Death of Mr. D. W. Crafts—Messrs. H. F. Coggeshall, William H. Snow and F. S. Richardson.

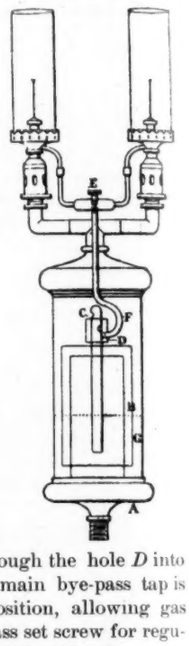
On the Death of Mr. George B. Neal.—Messrs. F. C. Sherman, P. Coyle and H. B. Leach.

The meeting was declared adjourned until 2.30 P. M.

[To be Continued.]

The Hall Automatic Regulator for Incandescent Burners.

In the illustration herewith the *Journal of Gas Lighting* recently described a device for the automatic regulation of incandescent burners, formulated by Mr. W. Hall, of Manchester, England. The apparatus enables the gas supply to any number of burners to be lowered on to the pilot lights, entirely shutting off the main supply to the burners, or the main supply to be turned on, and the pilot lights shut off, at will. It has been tested on the platforms of one of the Manchester railway stations, at various distances from the bye-pass taps with, we are informed, very satisfactory results. It is exceedingly simple in construction, and can be worked at a pressure of 1 inch, or anything above this. There are no leathers or valves to get out of order; the seal can be made with either oil, water, or mercury; and the whole arrangement can be produced at a very small cost for any number of burners. A lantern fitted with this appliance may be made practically dust tight; and chains dangling from the lamp cocks are entirely dispensed with, as no separate taps on the lamps are required. The regulator consists of a piece of 1¼-inch brass tube about 4 inches long screwed at both ends, and fitted with brass caps. The lower cap *A* is fitted with a ⅜-inch brass nipple to screw on the lamp burner pipe. A piece of 1-inch brass tube is screwed into the opposite side. This conveys the gas inside the brass float *B*, which has fitted to its center a piece of ⅜-inch brass tube about ¾-inch longer than the float. In this tube are two small holes *C* and *D*, one on either side. Before the gas is turned on, the hole *D* is directly opposite the outlet pipe *F*, which conveys the gas to the pilot lights only. The pressure on the main supply at this stage will be $\frac{3}{10}$ths; but the moment the main bye-pass is turned on at a pressure of $\frac{1}{10}$ths, the float *B* rises, shutting off the pilot lights, and allowing the main supply to pass through the hole *D* into the burners, which immediately ignite. If the main bye-pass tap is closed, the float settles down again to its former position, allowing gas to pass to the pilot lights only. *E* is a small brass set screw for regulating the supply to the pilot lights; while *G* shows the oil seal.



The Building of a Water Gas Plant.

[A paper read at the Ninth Annual Meeting of the Michigan Gas Association, by MR. C. W. TIPPY, of Detroit, Mich.]

The Detroit City Gas Company has two manufacturing stations: Station "A," in the western part of the city; Station "B," in the eastern, and a district holder between the two, at Chene street.

The average sales for December, 1900, showed an increase of nearly 30 per cent. over December, 1899, and reached the capacity of the two plants. On days of heavy consumption natural gas had to be depended upon to keep up the holder.

During the winter the supply of natural gas was nearly exhausted, and it became evident that it would not hold out another year. This meant that the Company would have to prepare, not only for the increase in sales, which would naturally come, but also for an unknown quantity, which must be furnished as soon as the natural gas should be shut off from the city.

After due consideration of the matter it was decided to install an 8-foot 6-inch Western Gas Construction Company water gas set, with a capacity of 800,000 cubic feet per diem, at Station "A," to run in conjunction with the two United Gas Improvement Company's machines already in operation; and a 10-foot set, with a capacity of 1,250,000 cubic feet per diem, with purifiers, engines and boiler room complete, at Station "B." It also became necessary to erect a 1,000,000-cubic foot storage holder at Station "B," using the present 300,000-foot holder as a relief holder.

The greater part of the gas is put on the street at Station "A," owing to the condition of the piping of the city; so a No. 8 Roots' exhauster, with reversing gear attachment, was placed at Chene street to act as an equalizer. The connections were made so that gas could be pumped to or from the holders at Stations "A," "B" or Chene street, or directly upon the street, as desired.

Steam for the coal gas plant at Station "B" was generated by two 75-horse power boilers, one of which had to be set up at Chene street to furnish steam for the exhauster. This could not be spared, however, until the three new 125-horse power boilers were ready to take its place.

The contracts for the apparatus were placed as follows:

1. Water gas apparatus Station "A" Water gas apparatus	Western Gas Construction Co.	Mar. 30, 1901	Aug. 1, 1901
2. Station "B," first set	Western gas Construction Co.	Mar. 30, 1901	Sept. 1, 1901
3. " " sec. set	Western Gas Construction Co.	Aug. 10, 1901	as soon as possible
4. Storage holder	Stacey Mfg. Co.	Apr. 2, 1901	Sept. 15, 1901

Each contractor worked under a heavy time forfeit.

The property adjoining the plant on the west was purchased for the

location of the new water gas plant, and that on the north for the erection of the storage holder. The first car of material for the holder arrived April 20, but as the deed for the land had not been received, the foundation was not yet started. When test holes were dug, at different points of the proposed foundation, the soil about 12 inches under the surface was found to be blue clay, very firm and hard. It was thought advisable to lay the concrete on this.

Ground was broken for the foundation, April 25. The excavation was made of sufficient depth to reach solid clay at all points. The foundation proper was made of concrete, dry-mixed with 1 part Wabash Portland cement, 3 parts clean, sharp sand, and 6 parts of clean broken limestone, which would pass through a 2-inch ring. The foundation was made 12 inches deep, except a ring 3 feet wide, around the circumference, which was made 18 inches deep to stand the additional weight of the tank and guide frame. One-fourth of an inch was the greatest difference allowed in the levels, as a small angle here would throw the guide frame, 120 feet in the air, several inches out of plumb. The foundation was turned over to the Stacey Mfg. Company, May 20, and the steel work was begun at once. The bottom and first side sheet of the holder tank were built upon 4 by 6 by 30-inch upright timbers. The riveting and calking on the tank were done by pneumatic riveters of the hammer type. The plates were checked by the use of a micrometer caliper, and were found to conform very closely to specifications. The bottom and first row of side sheets were finished on June 13, and after spreading a rich layer of sand and cement, 1 inch deep, over the foundation the tank was lowered. The sand and cement were taken under the tank in small wagons, with ropes attached to each end, and scattered by means of scrapers. Staples were left projecting 1 inch from the face, in order to insure the sand being scattered evenly. The 4 by 6 blocks were taken out at the center and piers built of them—the men working from the center outward.[1]

Plate No. 1 shows the form which the bottom assumed with the center just touching the foundation, and the circumference still up about 2 feet. The tank was lowered with the jacks, till the rim was within 6 inches of the foundation. It was then allowed to drop, as a large portion of the center already touched.

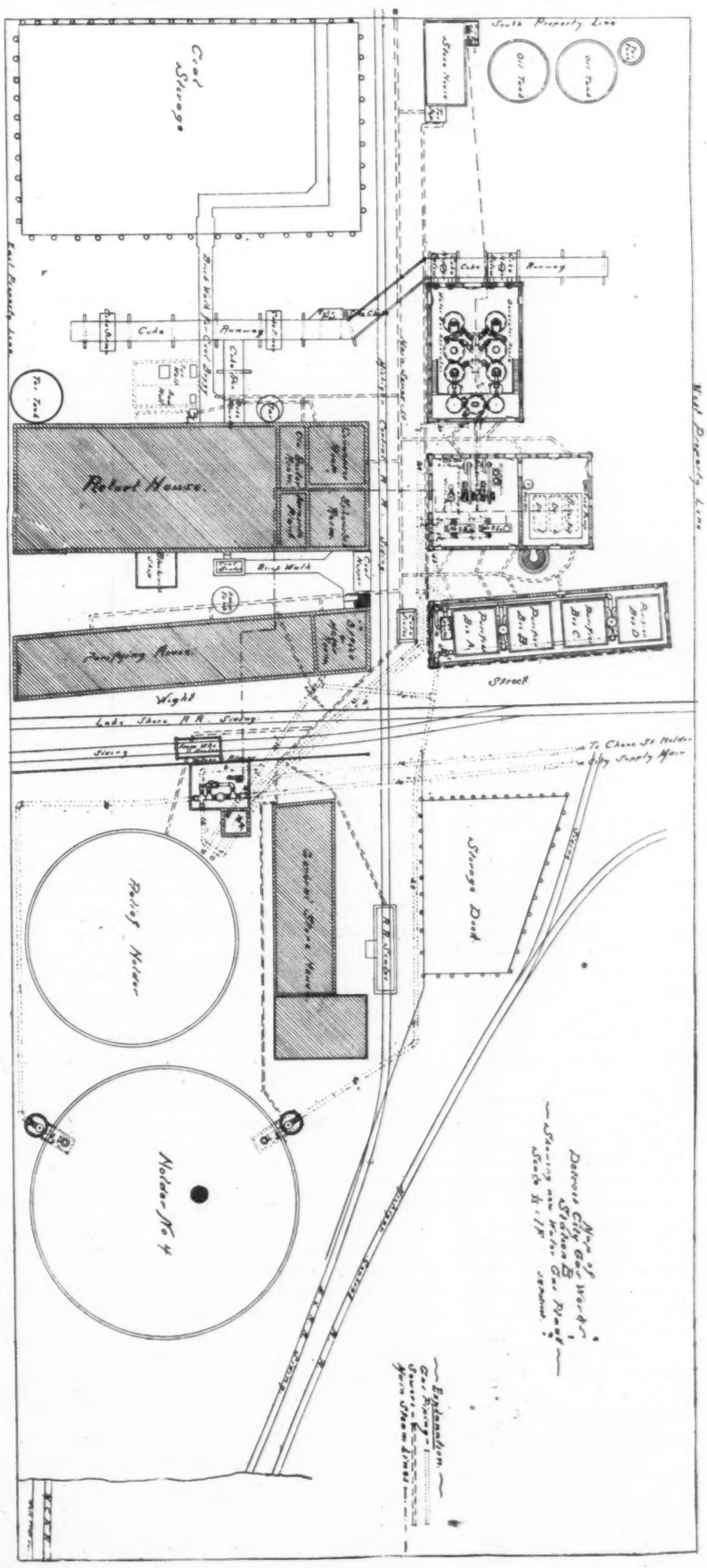
The inner section was started July 8. It was built from the bottom up, starting on its resting beams, while the men worked on scaffolds.

The middle and outer lifts were built on top of the tank. In order to do this the men worked on the crown of the holder and the platform around the tank. These lifts were lowered by means of 24 screw-jacks, as shown in Plate 3.

Plate No. 4 shows crown of the holder with permanent wood staging under it, and the men at work on the second lift.

Plate No. 5 shows a heavy guide frame standard being fastened to the tank. The external guide frame consists of 12 steel web standards. These are put up in 3 sections and connected by girders and steel cross ties. The first two sections were erected from the crown of the holder while it was down.

On September 23 the tank was cleaned, ready to be filled with water. A 6-inch cast iron pipe connecting with the city main had been run in, and the water was turned on for 2 hours, covering the bottom of the holder to a depth of 12 inches. The water was then closed off and levels taken of the resting beams. The inlet and outlet pipes were also filled, to test for leaks. Everything was found to be in good condition, so water was again turned on. It took the full 6-inch stream, acting under city pressure of 30 pounds, just 63 hours to fill the tank, which requires over 2,770,000 gallons of water. While the tank was being filled with water, the crown of the holder was closed and the inclosed air raised the



1. The author referred to the plates while reading, and no copies of them were made for illustrative printing.

inner lift about four sheets. Plate No. 6 shows the 6-inch main running up the side of the holder tank. The view was taken just before the water was turned off, and shows the two sections of standards in place.

The holder had to be raised two sections before the last row of standards could be placed. The derrick for this was worked from the crown of the holder. In order to raise the holder with air the water gas line to the relief holder was temporarily connected with the outlet of the storage holder. The fan was started and the air forced through the machine into the holder. This soon brought the holder to the desired height, and in Plate No. 7 is shown the placing of the first girder of the third section of standards. On October 3 the last of the guide frame was in place, and after plumbing the guide rails and deciding to paint it while in operation, the holder was ready for use. (Plate No. 8.)

Ground was broken for the new water gas plant on May 29, and the corner stone of the purifying house laid on June 6. The ground space for the erection of the new plant was limited. The plant, therefore, was designed as compactly as possible, and yet with the idea of keeping the buildings so separated that an accident in one part would not destroy the whole plant.

For years this property had been dumping ground for an iron furnace company, and in putting in the foundations the contractor had to dig through from 1 to 10 feet of slag to reach good clay bottom. Stone foundation walls were put in, with the outside plastered with a layer of cement mortar, mixed 1 to 1 to keep out the moisture. The walls were laid in cement-tempered mortar with blind binding courses, and all joints neatly struck with jointing tools. All brickwork above the roof line was laid in cement mortar, mixed 1 part Portland cement to 3 parts sand and covered with tile coping.

Generator House.—The generator house was designed for two 10-foot water gas machines. The intention was to install one at once, and the second one when needed. The building measures 63 by 43 feet, with 16-inch walls, 30 feet high. The charging floor is 16 feet above the ground floor line (Plate "A,") with the window sills only 7 inches above it. This gives a good circulation of air on the floor. The windows are pivoted at the center of the sash, and can be tilted to any angle and locked. The foundations for the machine were built with an outside ring of red brick and filled with old retorts and settings. The crevices between the pieces were filled with fine crushed stone, and flushed with cement mortar.

The apparatus, as ordered, consisted of one 10-foot by 15-foot generator with combination up-and-down valve connections, and fitted with hollow bearing bar grates for the divided blast. Also one 9-foot 6-inch by 20-foot carburetter with special vaporizing chamber, in which the oil is sprayed by 6 injectors protected from the heat by injector tube tile inlets, built in the lining. The air blast is distributed above the checkerbrick by an annular passage built in the side lining, opening with port holes with a combined area equal to that of the blast, into the combustion chamber. The superheater is 9 feet 6 inches by 27 feet. It is fitted with an 18-inch stack valve and a divided blast, as above. The seal, 78 inches by 48 inches, is placed on the charging floor and is connected to the superheater by an 18-inch pipe and to the scrubber with a 16-inch. The 84-inch by 24-foot 6-inch scrubber which comes next is filled with hemlock trays made of 1-inch by 6-inch boards, spaced 2 inches apart. The spray is connected so you can use the hot overflow water from the condenser or fresh cold water as desired. The condenser was designed for two machines, and is 90 inches by 24 feet 6 inches high, fitted with 220 3-inch tubes.

The oil is heated by exhaust steam in tanks placed in the engine room, and is fed to the machines by the improved automatic oil supply system. A constant supply is maintained regardless of the demand. The pressure is regulated by an adjustable relief valve, the pumps running constantly.

Coke is brought to the generators direct from the retort house on the coke runway, and dumped over chutes into coke hoppers suspended on trolleys, which carry them direct to the machine. When the hopper is directly over the coaling branch, the hinged bottom is dropped and the coke falls into the machine.

Two coke bins, which hold 12 hours' supply, were built under the runway, as shown in Plate No. 9, for cases of emergency.

The generator, carburetter, and superheater were set on 5-inch eye beams laid on top of the foundations. This keeps a circulation of air under them and protects the generator from the wet clinkers and ashes.

The blast for the machine is furnished by a No. 9 Sturtevant blower, driven by an Atlas engine. Plate No. 10 shows the 24-inch blast pipe being connected before the blast trench was built. It also shows the 5-inch eye beams under the shells. A pressure gauge board goes with each machine, and, besides showing the pressures on the apparatus, it shows the steam pressure in the main steam line to the machine, the oil pressure on the sprays and the nozzle pressure on the steam line to the generator.

Boiler and Engine Rooms.—Owing to delay in securing the steel for the three 125-horse power multitubular boilers they were not installed until long after the plant was in operation. All exhaust steam lines are run in steam trenches to the boiler feed-water heater in the boiler room. The live steam lines are run overhead in the buildings and in trenches between them.

The boiler stack is 5 feet in diameter by 110 feet high. For the first 25 feet and the last 10 feet it is lined with firebrick and the remainder with the red circle brick. Plate No. 11 shows it in course of construction.

The engine room contains 2 No. 8, direct-connected Roots' exhausters, 2 No. 9 Sturtevant blowers, driven by Atlas engines, 2 steam oil heaters and pressure pumps, and the works' water supply pump, which furnishes the water for both water gas and coal gas plants. (Plate No. 12.)

The purifying house was originally designed for one machine, with room for extending it when desired. When the second water gas set was ordered the west wall had to be torn out and a 53-foot extension added, which made the finished building 117 feet by 30 feet 4 inches, by 30 feet high. Plate No. 13 shows the finished boiler stack, and the men at work tearing out the west wall.

The purifying system consists of a Chollar washer at the inlet of the boxes, and four 20 by 20 by 11 foot 6-inch boxes, with 2 sets of trays each. (Plate No. 14.) The 16-inch gas connections are made at the top, at the center and at the bottom of the boxes. They are filled by oxide elevators from a chute placed outside the building. To empty the boxes you drop the 4 trap doors at the bottom and also in (Plate No. 15) the trays above, and the spent oxide falls to the floor below where it is hauled away in carts.

The gas is metered by a 100,000-foot Wiley proportional meter placed in the corner of the purifying house. (Plate No. 16.) At first it gave considerable trouble, owing to the rapid accumulation of drip water, but after connecting it with automatic drains no further trouble was experienced, and it handled gas up to a rate of 175,000 feet per hour in a very satisfactory manner.

The tar separator, as shown on the plan, is made of 2-inch white pine, and is 7 by 12 by 8 feet deep. About 4 feet from the overflow end a partition extends from the top down, nearly 3 feet and acts as a skimmer for the oils. The tar is pumped from the bottom to the tar storage tank on the dock, and in case it accumulates faster than it can be disposed of it is burned under the boilers.

Two 100,000-gallon oil storage tanks were erected on the dock, with an oil and tar pump house near by. (Plate No. 17.)

Pipe Connections.—The gas mains as laid are shown in the plans of the works. Twenty-inch butterfly valves are used in by-pass between the inlet and outlet of the relief holder, and also in the by-pass between the inlet and outlet of the exhausters. In case of back pressure on the machines from too much gas being passed through the 16-inch inlet, the by-pass can be opened and practically make 2 inlets and 2 outlets to the holder. By opening both by-pass valves and closing off the relief holder, gas can be made direct through the purifiers.

On August 26 natural gas was shut off from the city and the sales of manufactured gas increased beyond expectation. It soon became evident that the capacity of the plant as planned would be inadequate to meet the demand, and something must be done at once.

The contract was given to the Western Gas Construction Company for the second water gas machine and purifiers, and an extra sum was paid in order to have the steel shells made from stock and insure a more prompt delivery.

Construction.—The first shells for the generator house arrived on July 25. On August 3 the first work of erection was begun on the purifier, as the foundation work in the generator house had not yet been completed. On September 9 the street department began laying the pipe connections as follows:

1st. The line from the inlet to the storage holder, as far as the new purifying house, with the 16-inch branch, running to the coal gas line, ready to be connected when the coal gas plant should be shut down.

2d. The outlet line, as far as the outlet of the governor.

3d. The water gas mains from the generator as far as the governor house.

4th. The by-pass, which leaves the street line at the inlet to the gover-

nor, was carried ready to be connected to the coal gas inlet of the relief holder.

The 800,000 cubic feet of coal gas made at Station "B" could not be spared, except on Sundays, so everything was gotten in readiness to make the connection in one day. On Sunday, September 29, the coal gas plant was closed down at 6 A. M., that the crew might get an early start.

When the pipe at the inlet to the holder was opened it was found that the inlet valve did not close tightly, owing to the naphthaline deposited in the seat, and this inlet had to be sealed off. The men worked heroically, and at 6 P. M. the last connection had been made and the coal gas plant again started.

The new holder was not yet finished, so the gas was forced into the relief holder by opening the coal gas valve. The inlet served as both an inlet and an outlet to the holder, and the gas was put on the street through the by-pass to the inlet of the governor.

The steam boilers had not yet been started so it was decided to bring in a railroad engine (Plate No. 18) and run it, in conjunction with the two small boilers in the coal gas plant, until the new boilers were completed. The engine arrived October 1, and connections were made to the 4-inch steam line at the governor house. To do this the steam dome cover had to be removed and a steel flanged cover put in its place. The throttle and connecting rods were disconnected for safety.

On October 10 the coke runway was completed and the first coke taken to the generators. The generator had been under slow fire since September 20, and on October 4, at 1 P. M., the blast was put on the machine and the first run made at 6 P. M. Before the run was made the holder pressure was cut off from the city and Chene street carried the pressure for the east side. The valve on the coal gas inlet to the relief holder was closed, thus throwing the purified coal gas into the new storage holder. Two runs were made, raising the new holder about 3 sheets. The outlet drip pot was then opened, allowing the gas to escape in order to remove the remaining air from the holder and the new apparatus.

For a time it was hard to keep up the steam pressure on the locomotive, as the flues would fill with soot quickly. To overcome this, a mixture of coke and coal was tried and no more trouble was experienced. A gang of masons was worked night and day on the brickwork of the No. 2 machine, and on November 4 a slow fire was started in the generator before the connections to the down-run apparatus were completed. On November 8 the blast was put on and the first run made the next morning. (Plate No. 19.) It was started just in time, for in a few days the boilers were taxed to make steam enough to keep gas in the holders. In fact, the little boilers were forced so hard that on November 19 a blister appeared on one of them, and it had to be closed down and patched. A crew of boiler makers worked all night on it, and it was again started, at 11 P.M., on the 20th. This was none too soon, for the holder had only a few sheets left out of water.

On November 27 the back pressure in "B" purifying box became so high, because of the great volume of gas passing through it, that the seal to the Chollar washer could not be held and the purifiers had to be emptied. The 2,000,000 feet of gas was handled nicely by the one purifier that night and the next day, while "B" was being refilled.

About this time the holders began to drop, in spite of all that could be done with the amount of steam generated. As a last resort, the blacksmith shop, the ammonia still and the works' water pump were closed down and the city water turned on, in order to save all the steam for making water gas. This saved the day, but there were many similar experiences, before the new boilers were started on December 1. (Plate No. 20.)

The second set of purifiers was not completed until January, and all this time the two 20 foot by 20 foot by 11 foot 6-inch boxes purified from 2,000,000 to 2,500,000 feet of gas per diem in a very satisfactory manner. (Plate No. 21.)

The plant cannot be said to be completed, as there are many improvements to be put in when spring comes. It is in good working order, however, and has met all expectations.

THE Wellston Gas, Water and Power Company has been organized by Messrs. J. N. Nelson, J. L. Green and Wm. Huber, of St. Louis. The concern is capitalized in $100,000. The place named is a rapidly growing one, located close to the city limits of St. Louis, and the controlling spirit in the enterprise is Mr. J. L. Green, who is a son of Col. James Green, President of the Laclede Firebrick Manufacturing Company.

The Table Photometer and the Standard Pentane Lamp.[1]

The London Section of the Society of Chemical Industry, at Burlington House on February 3d, had before them an example of the new table photometer and 10-candle pentane lamp, as prescribed by the Gas Referees for use in the London gas testing stations. Dr. Frank Clowes described in detail the lamp and its accessories, and the method of using them; and his audience were extremely interested—this being, we believe, the first time the members have had this system of gas testing brought before them independently of other matters.

Dr. Clowes stated that there were now 23 examiners engaged every day not only in testing the gas supplied in London for its illuminating power, but in making several important purity tests. Some 20 of these gentlemen were colleagues of his own; and they were constantly occupied in making examinations in Greater London. The acts under which this testing was carried out prescribed that the methods of testing should be arranged by a body of carefully selected men, known as the Gas Referees. It might interest the members to know that the Referees were at present Professors Harcourt, Boys and Haldane. They had a number of duties to perform, and one of them was the selection of the sites of the testing stations. In the exercise of their prescriptive rights and duties, the new table photometer had also been brought into use. The new standard of light was Professor Harcourt's own; and the photometer itself mainly owed its arrangement to him, though Professor Boys had had a great deal to say regarding certain ingenious mechanical details of the apparatus.

Speaking first of the pentane lamp, Dr. Clowes said, as the name implied, the vapor of pentane was burnt in it. He supposed most of the members would be aware—anyway all those who had dealt with light petroleums would be aware—that the vapors of these petroleums were of great density. The density of the pentane vapor was almost precisely 2½ times the density of the air, and so it was an extremely heavy vapor. Before commencing, Dr. Clowes had poured some pentane into a beaker; and turning to it, he remarked that the liquid vaporized very considerably at ordinary temperatures of the air. During the time the pentane had been in the beaker, the vapor had been raising and lifting the air in the vessel. By simply tilting the latter, without pouring any of the liquid out, they could get the vapor transferred by its high specific gravity to a second vessel, and be able to kindle it. [Dr. Clowes here performed the experiment.] It was, therefore, quite easy to pour the vapor out and to siphon it from a higher level to a lower, very much as one siphoned liquid. It was on this principle that the Harcourt pentane lamp depended. The lamp was fixed to a pedestal; and the burner was supplied by a constant stream of mixed pentane vapor and air, through the longer leg of a siphon passing from a little flat metal chamber (called the carburetor) at the top of the stand. In the side of the carburetor was a small window for the purpose of seeing the level of the pentane. On the top of the chamber were two tubes, each controlled by a stopcock. One served for the inlet of the air which traveled over the surface of the pentane, and then passed through the second tube to the siphon. It was only necessary to open both the stopcocks to fill the siphon tube with the heavy vapor. The longer leg of the siphon was connected to the burner by a length of rubber tubing. In starting the lamp, the examiners did (what they termed) a little "milking," in order to draw the vapor from the box down the tube; and then, by its weight it continued to fall to the burner. The air in its passage over the pentane got charged with it; and by adjusting the taps properly, such a mixture of pentane was obtained that a standard flame was secured for testing purposes. He described, by means of a diagram, the arrangements for maintaining the flame at its standard point. An important addition, which was a great convenience, had been made. It was found that the easiest way to keep the flame at the standard point was to adjust the air supply at the entrance to the carburetor. This they were now able to control, from the position at which the observer sat, by means of a small screw which moved a thread running from the operator's end of the table to the lamp. The thread controlled the position of a little cone, which regulated the supply of air to the carburetor.

This standard pentane burner, Dr. Clowes remarked, had taken the place of the old candles. The candles were never, of course, quite satisfactory, because they could never be made to absolute standard quality; and it was only by burning a number at one time that something like an average effect could be obtained. The candles gave a fairly satisfactory result by doing this; but they were not such a steady or so satisfactory a standard by any means as this new lamp of Professor Harcourt.

Then coming to the photometer, it was as its name implied a table

1. *Journal of Gas Lighting*

photometer. The whole apparatus was arranged on a flat table, instead of being made to slide on a bar as in the old photometer. Speaking generally, the two sources of light (the pentane standard and the standard Argand burner with which the gas to be tested was used) both lighted one side of the observing screen—the light of each was made to strike separately on contiguous portions of a little transparent screen. The greatest novelty in this apparatus was that they did not bring the two illuminations to equality by shifting the position of the burner from which the gas was being tested; but the illumination was brought to equality by adjusting the supply of gas to the Argand burner—the gas being controlled by a tap which was at the right hand of the observer. If on looking at the two illuminations on the screen, he found they were not equal, he simply moved the tap, and set it in such a position that the illumination from the flame of the gas supply was exactly equal to the illumination from the standard burner; so that really the photometer depended upon the principle of gradually adjusting the feed of gas to the standard burner in such a way that the illumination produced by the burner was brought to equality with the pentane lamp.

The auxiliary apparatus and screens, their disposition on the table, and the methods of insuring standard conditions, were all carefully described and explained by Dr. Clowes. The whole of the apparatus, he mentioned, was painted black, so as to save any reflected light. A curtain was also placed at the end of the table, in order to prevent any stray reflected light from the walls and draughts to the burners. He had been told by the examiners that the apparatus worked very satisfactorily indeed, even when the ordinary light of the room was scarcely reduced; it was quite possible, unless there was some brilliant source of light present, to take readings with very fair accuracy. Of course, it was better to reduce the illumination of the room; but it was not absolutely necessary.

As chemists, those present would ask what was the nature of the pentane which was used? Of course, the success of the lamp as a standard depended largely on the pentane which was burned being always of fairly uniform nature and composition. It was the fraction (after three distillations) of light petroleum which distilled at 45° C. This portion was kept apart, and subjected to various processes of purification. Methods were described by the referees by which the pentane might be tested, so as to know that it was of the requisite degree of purity suitable for use in the standard. One of the determinations was that of vapor density, which lay between 36 and 38.

In order that the apparatus might be kept in standard working condition, it was also necessary that the holes round the steatite ring of the Argand burner should be of perfectly accurate gauge. Each perforation in the ring of the Argand must be precisely 0.45 inch; and each gas examiner was now supplied with two wire gauges for testing the holes successively all round the ring. One of these gauges was too small, and the other a little too large; so that one must pass in easily, and the other must refuse to pass in, in order to insure that the holes were perfectly true to size. Not only must newly made burners be gauged by these wires, but periodically the smaller gauge must be pushed down the holes of the burners, to ascertain that there was no choking taking place.

To keep the pentane flame always to its proper size, a little mirror was provided, in which the observer could see the reflection of the top of the pentane flame, and so ascertain whether the flame was adjusted rightly between the two specified points. If it was not, by still watching the mirror, he could, by means of the screw previously referred to, alter the air supply to the lamp; and in this way it was very easy for the observer to keep the flame adjusted to its necessary dimensions. Another little mirror reflected light from the Argand flame down on to the gas tap, so that the observer could see to read the scale. It also enabled him to see the face of the meter, and read the rate at which gas was passing. Of course, the rate of the passage of the gas was read after equality of illumination was obtained on the disc.

As a matter of interest, Dr. Clowes stated that a short time ago, he was at the house of Mr. Vernon Harcourt; and he showed him (Dr. Clowes) an application of the principle of this pentane lamp to the lighting of his billiard room. There was no coal gas laid on to the house, which was out in the country. At the top of a tower he had placed one of the carburetting boxes, and the vapor of the pentane, by its weight, was brought down to the billiard room precisely as it was used in the standard lamp. A most satisfactory illumination was obtained. Of course, pure pentane was not employed in the lamp; and after it had been in use some time, there was a residue of somewhat higher specific gravity than true pentane—the specific gravity of the pentane rose as it was used. Therefore, it was necessary, in the course of a little time, to empty out the residue contained in the carburetor before the pentane was exhausted. But Professor Harcourt, at his house, got over this difficulty by having a little lamp placed under the carburetor, and when he found the light was getting low in the billiard room, he lit the lamp, and used it until the whole of the residue was exhausted.

The example of the photometer present was, Dr. Clowes mentioned, the one which the London County Council called the travelling or portable photometer. The photometer was quickly converted into portable conditions, and easily taken to pieces and carried away. In other respects, it was identical with those used in the testing stations.

Discussion.

The Chairman (Mr. Otto Hehner) congratulated the present gas examiners on having this new instrument for carrying on their work. He himself had labored for many years with those inexact instruments of measurement—candles, and had recognized for years how inadequate that standard was. Great pains had long since been taken to establish standards of weight and length, measures of heat, and standards for electricity; and when one remembered that it was only quite recently that the candle was the actual measure of illuminating power, one could hardly express his gladness that it had now been superseded by the instrument before them. It was not generally recognized what an important thing photometry was. But when it was considered how large was the amount of money spent in illumination, and that everybody required light, well, then, it would be conceded that its quality ought to be exactly measured. That they had not before had an accurate measure was astonishing; and it showed how little attention had been given to the work. Mr. Dibdin had contributed a number of valuable papers on this subject, and he took it that Mr. Dibdin had done a great deal to bring about the happy condition at which they had now arrived.

Dr. C. A. Kohn (Liverpool) said he had a question to ask with respect to what one might call the reversing of the ordinary conditions of gas testing adopted in this standard. One recognized in the 10-candle standard many advantages—not so much in the purity as in the height or strength of the standard itself. To be able to work up from 10 to 16 or 20 was an enormous advantage compared with working up from 2 to 20. The candle power, he took it, was measured by the consumption of the gas; and he should like to ask Dr. Clowes whether he had confidence that, with gas measured under ordinary photometrical conconditions and burnt at the rate of 5 cubic feet per hour, the comparison remained very much the same, and to what extent, if there was a variation, the variation would depend on the richness of the gas. Perhaps there were other points bearing upon the comparison; but it was especially in reference to the relative value of this measurement and the direct value from the 5 cubic feet per hour measurement that he wanted information from Dr. Clowes.

Mr. D. A. Louis (London) said, since he had been sitting there, he had been watching the flame of the pentane lamp. He did not know whether or not it was then arranged for testing purposes, because there was a variable amount of darkness visible in the flame. It kept zigzagging about, and there was irregular illumination below the line. Another thing that struck him about the composition of the material used was this: Dr. Clowes had informed them that one of the difficulties Professor Harcourt had found in his local arrangement at home was that, after a certain time, it ceased to give the necessary illumination; and he then applied a little artificial heat. Now, supposing there was a variation in the temperature of the atmosphere, he should like to know whether this would affect the pentane in the box—whether, in warm weather, they would get a better illumination from the flame than in cold weather. It also struck him that, when the box was nearly full, there would be a small atmosphere of air above it, and that atmosphere of air could only take up a certain quantity of the heavy vapor, depending upon the temperature; and therefore probably there would be a variation when they took in a larger quantity of air than when a smaller quantity was passed in. The feeding of the lamp was rather interesting; and he asked whether it was necessary that the air feeding the lamp should be at a certain fixed temperature. He could understand that the inner air would be well warmed by the circulation round the chimney; but if the outer cone of air had also to be of a certain temperature, he should say that it would be subject to variation. On a day like that, for example, it would be very cold indeed compared with the air supplying the inner part of the flame.

Mr. T. S. Lacey (London) said he had had a great deal of experience with this pentane photometer during the last few years, though not much during the last few months; and he must say that the instrument was, so far as it seemed possible with an instrument based on a flame

standard, as nearly perfect as it could be made. It was important to note that the photometer was only part of the apparatus that was necessary for taking the light value. The room in which the photometer was used was a part of the instrument; and this photometer, like all photometers, would vary in its results according to the place in which it was employed. It was quite useless to specify the photometer which was to be used unless the conditions and nature of the room—ventilation and so on—were specified at the same time. The Argand burner was one which, even at the 16-candle point, was very sensitive to slight differences in the air supply. If it was burning to about 17 candles, it was not so sensitive; but if it was burning at a lower rate—say, 15 candles—it would be more sensitive. The difference in the temperature of the air must affect the amount of air passing through the heated chimney; and it also affected the amount of air which passed up the longer chimney belonging to the 10-candle standard. It by no means followed that the difference in the temperature and in the air supply to both burners would affect the light from both in the same proportion. Curiously enough, there was no regulation for temperature at which this instrument might be used. To use it as a standard instrument, he thought some temperature limit should be fixed. No one had succeeded in proposing a suitable standard except a flame one; and such standards did vary with the different conditions of the atmosphere in which they were burned. If the flames were affected in different directions, no doubt they would soon find the variations taking place; but the flames were affected in the same direction, though not in the same degree. Therefore, though they did not notice the variations in the flames, they did exist. Speaking of the general arrangement of the instrument, he said it was a great satisfaction that the whole instrument could be standardized very quickly. They had standard gauges for the lengths, which enabled the different parts to be properly placed very quickly. Examining the different parts, it was seen what an immense amount of care and scientific thought had been given to their construction. There had been an alteration in one part of the photometer, and he thought he had something to do with it. It would be noticed that the two lateral screens had a space underneath them, but originally they were constructed so as to reach to the bottom of the table. He pointed out to the Referees, and proved to demonstration, that, when the screens did not come down to the bottom, the flames were much steadier. If the flames moved about, and their peaks were not (as they ought always to be) at equal heights, it simply showed there were draughts. There was no difficulty in getting plenty of air through a room. But the air should be admitted in a number of openings in the floor, and the currents of air should be vertical, and not over the top of either of the burners. If there were currents of air passing over them, then the flames moved about.

Dr. Paul Dvorkovitz (London) said he had had to suffer through the absence of a perfect photometer. About six years ago he had a contract with the Bradford Corporation to enrich their gas by a certain number of candles, and many thousands of tests had to be carried out on the coal gas unenriched, and the coal gas enriched. If they had had at their disposal such a photometer as they had now, he was quite sure that it would have been shown that his contract with the Corporation was being fulfilled. The objection to the whole of the photometers which had been in use was that there had been a necessity to pass the gas through at the constant rate of 5 cubic feet per hour. But if they passed 5 cubic feet of rich gas and then 5 cubic feet of poor gas through the same burner, they got absolutely different results. A burner had only a certain supply of air, and naturally with the same burner they could not, passing 5 cubic feet of poor gas and then 5 cubic feet of rich gas through it, show in proper proportion the increased advantage of the latter gas over the former. The results could not be true.

Dr. Clowes, replying to the discussion, said Dr. Kohn had asked about the testing of gas of varying candle power. He was quite right. It was not correct to test gas of considerably less than 16-candle power by precisely this arrangement. If, for example, they wanted to test a gas which was of 14-candle power, the Argand burner ought to be shifted away, and made into a 14-candle standard. This Mr. Harcourt had abundantly proved. Mr. Louis unfortunately had been observing the wrong part of the flame. From where he had been sitting, he could only see the jagged top of the flame; but if he went round to the other side of the photometer, he would see the portion of the flame which was actually used for testing. Objection was taken to the accuracy of the apparatus when the temperature of the room or the atmosphere of the room changed. It would appear that there must be a more rapid evaporation of the pentane when the room was warm than when comparatively cold. Most careful experiments, however, had been carried out to ascertain whether this amounted to anything; and Mr. Harcourt had made standard tests varying through such ranges of temperature as would be possible in any observing room. He had found that, with the standard conditions he (Dr. Clowes) had mentioned, the flame still maintained its standard character. The temperature did not affect it to any appreciable extent, even when the range was wide. As to other conditions mentioned by speakers, of course, they must not have these flames actually blown about. But when the screen was in position, there was not the necessity with this instrument for the niceties which were so frequently insisted upon as absolutely indispensable for accuracy. The instrument had been tried under extremely severe and varying conditions from time to time, and had given absolutely identical readings. The niceties which applied to the older forms of photometers did not apply in the same degree in this type. Mr. Lacey seemed to think that this photometer had need of a most carefully designed and carefully appointed gas testing station—that its use under any conditions but these would likely lead to absolutely untrustworthy results. There he was entirely mistaken. He (Dr. Clowes) had most carefully tried this under conditions that were not considered standard ones; and he could assure those present that the readings of the photometer would not vary. Of course, he did not refer to actual dancing or movement of the flames. But the old refinements were not essential to this instrument.

The Practical Effect of Over-Capitalization.

By "T. L."

The following figures show substantially the actual facts pertaining to five different, well-known gas companies in the country, and afford an interesting comparison.

"A" is an exceedingly well-managed company, which has had a

	A.	B.	C.	D.	E.
Capital: Bonds	....	....	$1,500,000	$4,600,000	$5,900,000
Shares	$1,750,000	....	1,750,000	4,500,000	9,000,000
Total.....	$1,750,000	$4,000,000	$3,250,000	$9,100,000	$14,900,000
Make of gas, cubic feet.....	873,000,000	1,300,000,000	180,000,000	650,000,000	578,000,000
Capital per 1,000 cubic feet made: Bonds	....	....	$10.76	$6.92	$10.20
Shares	$2.03	....	12.56	7.07	15.57
Total.....	$2.03	$3.08	$23.32	$13.99	$25.77
Amt. required per M. sold to pay 5 per cent.: Bonds	....	....	53.50	35.38	51.04
Shares	10c.	....	62.70	34.62	77.85
Total.....	10c.	15.40c.	$1.16	70c.	$1.29
Selling price of gas.....	90c.	80c.	Total av'ge, $1.24½	Light, $1; fuel, 80c.	$1.00
Approximate cost of coal.....	$3.70	$2.00	$2.68	$2.00	$1.80
Market value: Bonds	....	....	85c.	....	....
Shares	212	....	10c to 12c. = $	....	8c. = $

steady and rapid increase, over a long period of successful working; capitalization very low.

"B" is also an exceedingly well managed company, which has had to do considerable fighting during its career; capitalization fair and moderate.

"C," "D" and "E" are fair specimens of over-capitalized, or so-called "reorganized" companies. Would not *dis*organized be a more appropriate term?

Oil in New Mexico.

The *National Oil Reporter* notes there is what promises to make an oil field of great extent near Gallup, in Western New Mexico. At Gallup are located the most extensive coal mines of the Southwest, having for years supplied much of the coal used in Southern California, Arizona and New Mexico. The oil field is situated from 18 to 50 miles easterly from Gallup.

About 10 miles north from the Santa Fe Pacific railroad, an oil bearing stratum of sandstone crops out on the brow of a mesa in an almost unbroken line for a distance of 18 to 20 miles. This oil stratum was first discovered by a geologist for the Atlantic and Pacific railroad, about 18 years ago, who for himself and others, then, ran a tunnel about 18 feet long into the sand rock, when they had to abandon the enterprise on account of hostile demonstrations by Navajo Indians. Oil has been oozing out of the rock into this tunnel since, and about 20 barrels had accumulated when, a year ago, after the California oil excitement, this field again received attention.

Lately another and higher oil stratum has been discovered cropping out. The springs in the district bring up from below bubbles of oil with the water. Some of the springs are covered with a black, tarry substance. At one place there are fissures in the earth from which issue gas and hot air. At another place, the oil oozes out of the rock, along the surface, for a distance of a quarter of a mile. Prof. Herrick, geologist and president of the New Mexico University, has made an estimate that there are in sight on one location 7,500,000 tons of saturated oil rock which will yield 350,000 to 750,000 tons of asphalt worth $10 a ton. The oil has been analyzed, and is said to be of a good quality, valuable as a fuel oil, also as a lubricant, and as most of the volatile parts had evaporated, while slowly oozing out, it will probably contain a large percentage of illuminants also. The analysis showed 28½ per cent. illuminating oil.

The field has been examined for the local companies by several eminent geologists, oil experts, and practical oil men, all of whom report that the geological formation consisting of coal, sandstone, and immense beds of bituminous shales, etc., is all that could be desired for the expectation of finding large bodies of oil underneath.

Many companies have been formed which have taken up land, but so far very little has been done to explore the field. Only one company has commenced to drill, and it has attained a depth of 1,000 feet, passing through two oil strata. Before starting, the expert for this company estimated that it would have to drill to a depth of 1,300 to 1,400 feet feet before getting an oil well.

In the Gallup field, the surface indications for oil compare favorably with those of any other field in the United States, and the owners of the land firmly believe that it will make one of the most extensive and permanent oil fields in the world. Unfortunately for them, they are men with but limited means and so far have been unable to do anything toward a systematic exploring and developing of the field. The history of other oil fields will probably repeat itself in this field, and lands that go begging now and could be bought at nominal prices, will as soon as the first paying well is struck, advance a hundred fold.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Two very handsome trade catalogues recently to hand are: Catalogue No. 21, issued by the Wm. M. Crane Company, of this city; and the "Year Book" put out by the proprietors of the Detroit Stove Works, of Detroit and Chicago, who, as almost everybody in the gas trade knows, are the manufacturers of the Detroit Jewel gas ranges. Both catalogues are handsome specimens of the printer's art. The Crane catalogue, of course, refers to the specialties of that well known house, prominent in which are the "Vulcan and Perfect Appliances for Cooking." The Crane folks in reality publish this season three catalogues, that may be thus described for identification: The "red cover," descriptive of cooking appliances; the "green cover," descriptive of heating appliances; the "blue cover," which has to do with "Bray burners."

WITHIN the next fortnight or so the office force of all the departments of the Riter-Conley Manufacturing Company will be assembled in the new office building which the Company has been constructing on the site of its original shop in Pittsburg. The structure is three stories high, has a frontage of 50 feet on Water street and extends through the block to First avenue. Some idea of the accommodations of the office plant may be gained from the statement that the draughting room occupies the entire third floor of the structure, and that it will easily and comfortably afford working quarters for 125 draughtsmen.

RESPECTING the Riter-Conley Company's new manufacturing plant, which is being rapidly pushed to completion. It is located at Ledsdale, at a point on the Ohio river some 15 miles from Allegheny. The site comprises 70 acres, and it is between the river and the tracks of the Pennsylvania Railroad, not far from the "Conway Yards" of the latter Company, at which place all through freights going east or west are made up. The location is an ideal one. The first section of the power house is nearly completed. No steam power will be used at this plant, all power being developed through gas engines. The main units are 300-horse power Westinghouse engines, directly connected to alternating current generators, and throughout the shops tools will be operated by individual induction moters. Compressed air will be developed by gas engines, operating belt-driven compressors. The shops at this point will be in a number of 85-foot spans, ranging from 600 feet to 800 feet in length.

FROM the latest pamphlet issued by Mr. John Cabot, respecting the virtues of Church's patent bolted and riveted trays for gas works, it can be readily seen that these goods are in great demand. Orders from gas works in 45 different States have been satisfactorily filled, and shipments to many points in Canada are also recorded. Three points in Cuba were also supplied, and shipments to Mexico and South America were also listed.

MR. H. A. PERKINS informs us that he has resigned the dual position of Secretary and Manager of the Brooklyn (N. Y.) Firebrick Works, in order to become associated with the Newton-Perkins Firebrick Company, of Albany, which firm succeeds to the business heretofore conducted under the title of Newton & Co., who were the proprietors of goods put on the market as coming from the "Albany Salamander Works." The New York office of the Company is in the Taylor Building, 39 Cortlandt street.

MESSRS. EDWARD D. MCVEY, D. J. Donahue, Chas. J. Darling and others have incorporated the Chelmsford Gas Light Company, which proposes to engage in the supply of gas "in and about" Lowell, Mass. The concern is capitalized in the sum of $300,000, "or more." It is not at all likely that the Company will ever engage in active business, for Lowell has been and is supplied with good gas by a Company that for years had the distinction of maintaining the cheapest gas rate in America.

F. P. BRADEN and associates have been granted a franchise for the manufacture and distribution of gas for light, heat and power uses in Ontario, Cal.

"A. R.," writing from Fresno, Cal., under date of the 21st ult., says that the plants of the Fresno Gas and Electric Company have gone under the control of the California Central Gas and Electric Company.

TWO sufferers from the recent disastrous floods in Pennsylvania were the Lebanon Gas Company and the Mauch Chunk Gas Company. It is said that the plant of the latter was badly wrecked.

ON the 25th inst. the voters of Durango, Col., will be called upon to express their will respecting the franchise recently granted by the City Council to Eastern capitalists for the building and operating of a gas works in Durango.

"B. T. F." is informed that the dividend (4 per cent.) recently declared by the Columbus Gas Light and Heating Company, of Columbus, O., is payable the 15th inst.

THE United Gas Improvement Company will construct a new, model purifying house at its Point Breeze works, Philadelphia. The dimensions of the structure will be 200 feet by 50 feet by 40 feet in height.

A CORRESPONDENT in Milwaukee, Wis., writing to us under date of the 4th inst., says: "Dear JOURNAL: Mr. E. G. Cowdery, General Manager of the Milwaukee Gas Light Company, was given a surprise, the

morning of the 3d inst., that will long be remembered by him. On the 1st of March, 1877, Mr. Cowdery began his career with the Milwaukee Gas Light Company, and he has, with the exception of less than two years' absence, been constantly with the Milwaukee Company. Mr. Cowdery had been in the East on business for several days, and the employees from all departments took advantage of his absence to arrange some means of showing their real regard and esteem for him on this (practically) his twenty-fifth anniversary with the Milwaukee Gas Light Company, which they did in a most befitting manner. When, on the morning of the 3d inst., Mr. Cowdery entered his office, his surprise was great indeed, for his quarters were magnificently decorated with a profusion of American Beauty roses and blooming plants of many descriptions. The inner entrance to the office was an archway of vines, and his desk was so lovely that Mr. Cowdery, I believe, hesitated to open it for fear of spoiling the effect. All the gas fixtures and furnishings were covered with vines and flowers. On the floor stood a beautiful piece of statuary with an appropriate inscription thereon, and on the wall hung a fine picture, both of which were presented to Mr. Cowdery by the employees under him. During the forenoon most of Mr. Cowdery's time was taken up in receiving the congratulations and goodwill of the employees, who had assembled for such purpose; and may our best wishes attend him.—Mc."

THE proprietors of the Cambridge (Mass.) Gas Light Company have awarded to the Western Gas Construction Company, of Fort Wayne, Ind., a contract for the installation of a complete tar extracting, exhausting, condensing, washing, scrubbing and purifying apparatus, based on the Western Company's system. The apparatus is to be arranged to care for an output of 2,000,000 cubic feet per day.

MR. F. A. PINKNEY, who resigned the post of General Manager to the Equitable Gas and Electric Company, of Utica, N. Y., last November, and who since then has been largely concerned in the affairs of the Utica Heater Company, has accepted the position of General Manager of the Steelton (Pa.) Home Gas Company. He expects to become a permanent resident of Steelton Saturday next.

THE Fairmont Gas Light Company, to operate in Fairmont, W. Va., has been incorporated by Messrs. W. H. Nicholson, Walton Miller, M. L. Hutchinson and J. F. Watson, all residents of Fairmont. The concern is capitalized in $200,000.

THE turnover of the capital of the Hazleton (Pa.) Gas Company to capitalists of Wilkes-Barre, Pa., has been satisfactorily completed.

"S. Y. R." is informed that the Municipal Gas Company, of Chicago, Ills., which was originally organized to operate gas plants at any available points in Illinois, has been dissolved.

THE residents of Albert Lea, Minn., are agitating the matter of the establishment there of a gas works. The place has a well-established and fairly well operated electric lighting plant.

MR. NICHOLAS L. WALKER has resigned from the service of the Standard Gas and Electric Company, of Raleigh, N. C.

THE capital stock of the Houston (Tex.) Gas Light Company has been increased from $200,000 to $400,000.

MR. C. F. BENSON, who has been General Manager of the St. Cloud (Minn.) Gas and Electric Company since 1883, has resigned. His temporary successor is Mr. George E. Macomber.

THE plant at Media, Pa., is likely to shortly come under the control of the Philadelphia Suburban Gas Company.

A CORRESPONDENT in Providence, R. I., incloses the following: "The annual meeting of the Providence Gas Company was held at noon of the 3d inst. The election for officers resulted as follows: Directors, Wm. Goddard, Royal C. Taft, G. W. R. Matteson, N. D. Arnold, J. E. Studley, Henry Pearce, John W. Ellis, J. C. Bates and R. H. J. Goddard; President and Manager, John W. Ellis; Vice-President, Wm. Goddard; Treasurer and Secretary, William P. Nye. The report of the President was a brief one. It set forth the fact that the property of the Company had been retained in good condition, as all repairs and renewals had been made to provide not only for the present, but future requirements of the continually increasing output, which has been so marked in the prosperity of the Company. Interesting statistics embodied in the report were as follows: Gas made during the year 1901, 774,576,000 cubic feet, being an increase of 38,434,000 cubic feet, or 5.21 per cent. To produce this amount of gas, composed of an equal amount of water and coal gas, the following materials were used: Gas coal, 33,666 gross tons; Lehigh coal, 2,118 gross tons; naphtha, 3,231,451 gallons; coke, 363,504 bushels. The following residuals were sold: Coke, 366,483 bushels; coal tar, 357,558 gallons; ammoniacal liquor, 1,489,519 gallons. The distributing system was extended during the year by laying 50,265 feet of main pipe, and 4,016 feet of pipe was relaid, to provide for pipes of larger size. There is now 277.375 miles of main pipe. The number of new services put in during the year was 1,024, and 67 old services were either relaid or relocated. The number of meters in use January 1, 1902, was 29,923, being an increase of 1,613 during the year. The number of gas stoves put in during the year was 777, being a total of 14,953, and this was exclusive of heaters and also of all stoves and heaters sold by other parties."

ACCORDING to the annual report of the Municipal Lighting Department of the Town of Westfield, Mass., a prosperous year was experienced. The recommendation is made that a reduction in the price of gas of 10 cents per 1,000 feet be made, which will bring it down to $1.50. The usual discount will be allowed for prompt payment of the bills, thus making the price $1.40. A large outlay is required to improve the plants this year, another new bench being needed at the gas works and a dynamo for the street circuit. A table is given, showing that of 9 towns and cities having an output of between 10 and 22 millions feet of coal gas, 5 have a higher rate than Westfield, 2 the same and two 10 cents lower. The report contends that the price cannot be reduced more than 10 cents at present. Some believe that the plants should be run for the benefit of the consumers, but the report says that the taxpayers bought the plant and should derive what benefits there are from it. Of the 2,917 property taxpayers, only 697 are gas consumers. The total cost of the plants, according to the report of Manager Pettibone, has been $157,404, which includes the improvements made the past year. The State requires charging of depreciation, which amounts to $18,657, thus making the value of the property, according to the laws of the commonwealth, $138,747. The amount of new pipe laid was 2,434 feet. The receipts are over $5,000 in excess of last year, amounting to $45,989, and included $26,742 for sale of gas and $15,839 for sale of electricity. The expenses reach $51,574, which is $10,000 more than last year. Some of the principal items were: Operating expenses, gas, $17,607; electric department, $9,004; interest, $3,990; bonds, $4,000; gas construction, $6,268. The excess of receipts over expenditures was $4,414, against $9,233 last year. During the past year the operation of the electric lights all night was begun. The profits are given in detail, and amount to $13,241 in the gas department and $5,031 in the electric light department. This makes a total of over $18,000, against $17,500 last year. A net profit of 11.3 per cent. is shown, which, with the depreciation deducted, makes the profit 6¾ per cent. The number of gas consumers has increased 158 since the town began operating the plants. The output of gas for the year was 18,150,500 feet, a gain of nearly 2,000,000 feet."

Iron Age says it is worthy of note that the first fatal accident to occur to an employee of the Niagara Falls Power Company, in the electrical department, has just been recorded. The wonderful installation of this Company was instituted in 1895, and for all 7 years have passed none of the men engaged about the deadly wires has met death until Wednesday, February 26, when Melvin A. Johnson, an assistant electrician, was so badly burned that he died within 10 hours. The deceased was a careful man, and had gone under the switchboard to make a connection on a dead switch. In some manner he made the unfortunate mistake of starting to connect up a live cable. A short circuit was created and the flash set fire to Johnson's clothing. He was seriously burned from head to feet before help reached him. Those familiar with all the circumstances agree that the accident was in no way due to carelessness on Johnson's part, but simply an unfortunate, regrettable mistake. That so many years should go by without several similar accidents in connnction with an installation so new and novel is remarkable.

MESSRS. W. J. PEALL and Thomas P. Strittmater have been granted a franchise to lay mains from Paulsboro, N. J., to Swedesboro and Bridgeport, N. J., for the supply of gas to the named places. It is likely the franchise was obtained for the South Jersey Gas, Electric and Traction Company.

The Market for Gas Securities.

The advance makers of history are again right busy with an output of suggestion regarding the future relations of the Consolidated and Brooklyn Union Gas Companies. It is asserted with some positiveness that the merger is close at hand, and it may not be denied that, if some sort of a deal is not brought off this summer, the Brooklyn Union folks will have to expend quite a bit of money in construction work. However, the Company will not have much trouble in "getting" the money to pay for such construction. Consolidated, after wavering some early in the week, closed strong, the finals to-day (Friday) being 221½ to 221¾. There is a good demand for city gas bonds.

Brooklyn Union is quoted at 218 to 220, and the probability is that much higher figures will be made in it before May 1st. Baltimore Consolidated is being traded in rather extensively, and the purchasers are the ones who are making the concessions. Peoples, of Chicago, is as it was a week ago, and the same may be written concerning Lacledes. Bay State is still on the list!

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 Wall Street, New York City.

March 10.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	221¼	221¾
Central Union, Bonds, 5's.	3,000,000	1,000	109½	111
Equitable Bonds, 6's	1,000,000	1,000	105	
" 1st Con. 5's	2,300,000	1,000	115	118
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	298	315
Municipal Bonds	750,000	.	..	
New Amsterdam Gas Co. Bonds, 5's	11,000,000	1,000	111	112
Northern Union, Bonds, 5's.	1,250,000	1,000	106	108
New York and East River Bonds 1st 5's	3,500,000	1,000	111	115
" 1st Con. 5's	1,500,000	..	109	111
Richmond Co., S. I.	348,650	50	100	..
" Bonds	100,000	1,000	103	
Standard	5,000,000	100	130	135
Preferred	5,000,000	100	150	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	118	..
Yonkers	299,650	500	130	
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	218	220
" " Bonds (5's)	15 000,000	1,000	119	119½
Bay State	50,000,000	50	⅝	¾
" Income Bonds	2,000,000	1,000	.	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	500,000	1,000	93	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	10½	11½
" " Bonds, 5's	5,250,000	1,000	79	80½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000		
Central San Francisco	2,000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co.	29,500,000	100	101⅝	101¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	106	107
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	60	65
Preferred	3,026,500	100	84	86
Consumers, Jersey City Bonds	600,000	1,000	102	103
Consumers, Toronto	1,700,000	50	218	225
Consolidated, Baltimore	11,000,000	100	67	67¼
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's.	1,000,000	..	..	..
Equitable, 1st 6's.	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	12	14
" Con. Mtg. 5's	380,000	1,000	80	81
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	...	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50		89
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	3?:,000	1,000	89	89½
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	34	38
Fort Wayne	2,000,000	..	..	.
" Bonds	2,000,000	..	53	55
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	102	104
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	60	64
" Bonds, 6's	2 650,000	..	99½	101½
Jackson Gas Co	250,000	50	73	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	96
Preferred	2,500,000	100	..	11?
Bonds	10,000,000	1,000	..	108½
Lafayette Gas Co., Ind.	1,000,000	100		60
Bonds	1,000,000	1,000	48	55
Louisville	2,570,000	50	110	12?
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	107½	108½
" 6 per cent. scrip, due 1910	100,000	25	25	87
Montreal, Canada	2,000,000	100	182	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	..	55
Bonds, 6's	4,600,000	..	..	103
New Haven	1,000,000	25	300	325
Nashville Gas Lt. Co.	1,000,000	100	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	99⅛	99⅝
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	48	48½
St. Paul Gas Light Co.	1,500,000	100	60	63
1st Mortgage 6's.	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	93	96
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	98	96
Syracuse, N. Y.	1,750,000	100	15	17
Bonds	1,612,000	1,000	95½	97½
Washington, D. C	2,600,000	20	..	..
First mortgage 6's	600,000	..	..	..

STOCKHOLDERS' MEETING.

Office of The United Gas Improvement Co., N. W. Corner Broad and Arch Sts., Philadelphia, Pa., March 1, 1902.

The Annual Meeting of the Stockholders of the United Gas Improvement Company will be held at the office of the Company, northwest corner of BROAD AND ARCH STS., PHILADELPHIA, on Monday, May 5, 1902, at 12 o'clock, noon, for the purposes of electing a President and six Directors, to serve for the ensuing year, considering and acting upon the subject of a proposed increase in the capital stock of the Company from 450,000 shares, of the par value of $50 each, to 565,000 shares, of the par value of $50 each, and transacting such other business as may properly come before the meeting.

The stock transfer books will be closed from 3 P.M., April 29, until 9 A.M., May 6th.

By order of the Board of Directors,

1396-4-e.o.t LEWIS LILLIE, Secretary.

POSITION WANTED.

AN ENERGETIC MAN, 30 years of age, desires a position in connection with a gas works. Is a competent draughtsman, is a technical chemist, and is thoroughly conversant with the principles and practice of gas manufacture and gas works construction. Can furnish any references required.

1396-2 Address "H. B. C.," care this Journal.

WANTED,

Position as Manager or Superintendent,

By an energetic man, having had a large experience in the manufacture and distribution of both coal and water gas. Fully competent to supervise all improvements and extensions. A1 references. Address, "W. J. V.,"

1396-2 Care this Journal.

Position Wanted by a Practical Man,

Twenty-eight years of age. Have been in the gas business several years. Understand the laying of mains and services; reading, setting, testing and repairing meters; making gas stove connections, and all kinds of complaint work either inside or outside of gas works. Is conversant with all sorts of gas appliances. Understands the manufacturing and distributing divisions of gas supply. Best of references.

1396-1 Address, "S. F. A.," care this Journal.

WANTED,

Position as Manager or Superintendent of a Gas Works.

Have had years of experience. Excellent references. Address, "F. J. R.,"

1395-2 Care this Journal.

Position Wanted

As Manager or Superintendent,

By a young man having 14 years' experience in construction work and in the manufacture and distribution of coal and water gas. Change desired. References

Address, "RESULTS,"

1395-2 Care this Journal.

WANTED,

Practical and Experienced Man,

To take charge of gas and electrical plant in town of 8,000 inhabitants. Must have experience in manufacturing both coal and water gas, the laying of mains, and be fully conversant with gas stove business. Must be a hustler and temperate. Young man preferred. Address,

VALPARAISO LIGHT AND FUEL COMPANY,

1396-1 Valparaiso, Ind.

SUPERINTENDENT WANTED.

A gas company within short distance of New York City wants a young man as Superintendent of Manufacture and Distribution.

Address, "GAS,"

1395-2 Care this Journal.

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Fifteen First-class Stove Mounters,

To work on gas ranges. Address,

ABENDROTH BROTHERS,

1394-3 PORT CHESTER, N. Y.

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Second-Hand Apparatus, as follows:

4 Purifier Boxes, about 8 feet by 8 feet by 2½ feet.
1 Five-foot Station Meter.
1 Set Water Gas Apparatus, 4 feet or 4½ feet.

Send full specifications, plans and price, with date of delivery. Address,

"STANDARD,"

1378-tf Care this Journal.

WANTED,

"Journal of Gas Lighting," London, England.

Two copies of No. 1,998; August 27, 1901.
One copy of No. 1,999; September 3, 1901.

Address, giving price, WALTON FORSTALL,
1395-3 Broad and Arch Sts., Philadelphia, Pa.

FOR SALE.

Two sections 16-inch hydraulic main.
Six mouthpieces, 15 inches x 23 inches.
Six 6-inch standpipes.
Five 6-inch bridgepipes.

For further information, write the

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500 old-style square heads, $1.50 each.
500 No. 51 Miner heads, $2.50 each.
300 No. 29 globe boulevard heads, $3 50 each.
1,000 five-foot Wilder volumetric governors, 15 cents each.

Lamps will be crated and delivered on board cars in good order. Address,

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1335-4 MILWAUKEE, WIS.

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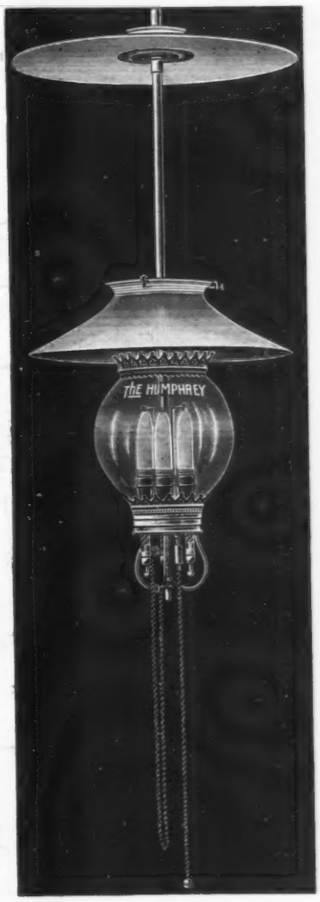
A Complete Revolution in Gas Lighting.

A sample lamp sent on 30 days' trial to any Gas Company.



This lamp is thoroughly protected with both Mechanical and Design Patents. Imitation of this Design and Construction will be prosecuted.

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Economize Heat in Water Gas Plants,
BY UTILIZING A
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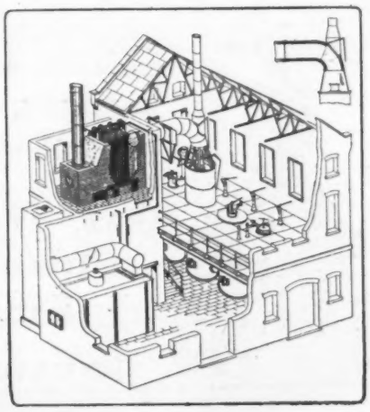

To absorb the heat now going to waste when you blow through your superheater to heat the feed water for your boilers to the temperature of the steam. This is now being done at the POUGHKEEPSIE GAS WORKS, Poughkeepsie, N. Y.

Write for full particulars how this is accomplished, the saving effected, and the advantages gained, to the

GREEN FUEL ECONOMIZER CO.,
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NO EXTRA LABOR OR OPERATING EXPENSES.

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Not Expensive. Write to
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Telephone, 6-M Rutherford.

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Means less labor to a tap and more taps to the day.

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DECATUR, ILLS.

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TROY, N. Y., U. S. A.

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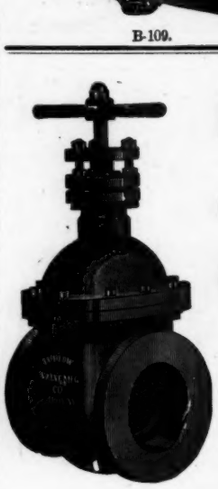
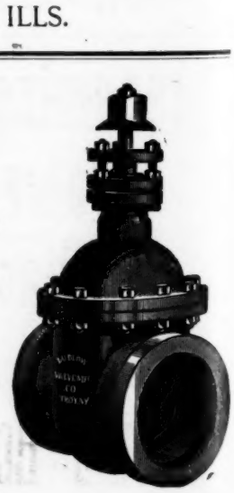
—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.





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CENTER-SUPPORT CAP MANTLE.

A BRILLIANT SUCCESS.

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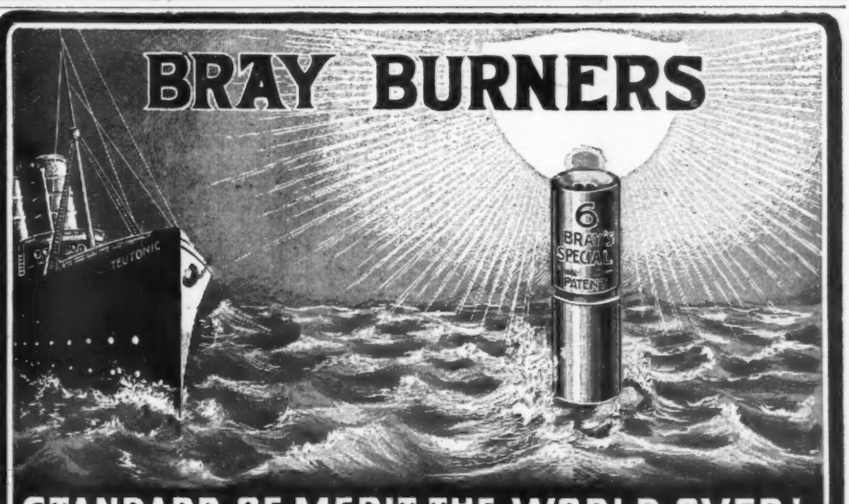

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Coal and Water Gas Plants.

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RECUPERATIVE FURNACES, WASHERS, CONDENSERS, PURIFIERS, PURIFYING MACHINES, COKE CONVEYERS, ETC.

SOLE UNITED STATES AGENT FOR

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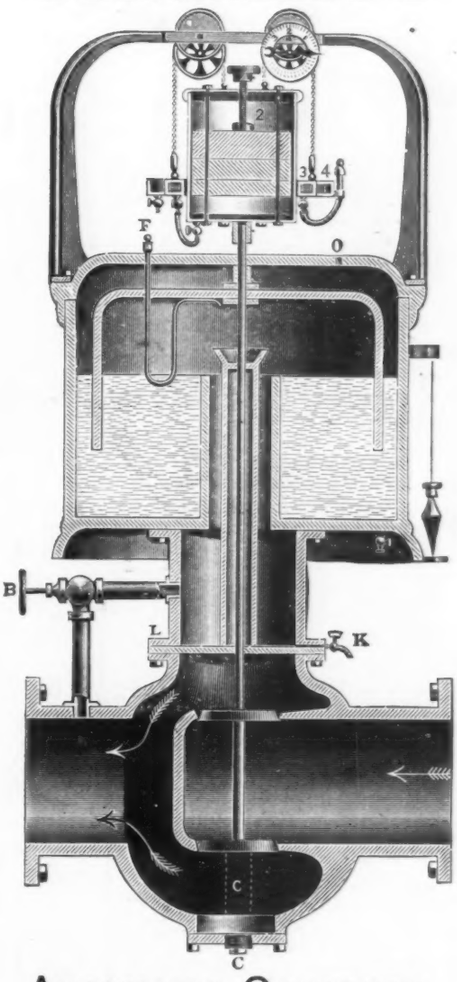

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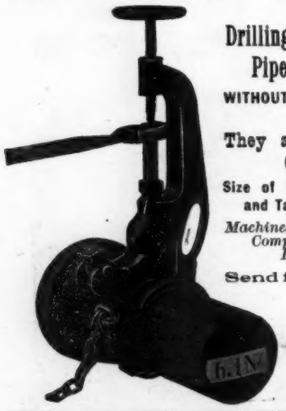

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They are Strong and Compact.

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Machines Sent to any Gas Company for Thirty Days' Trial.

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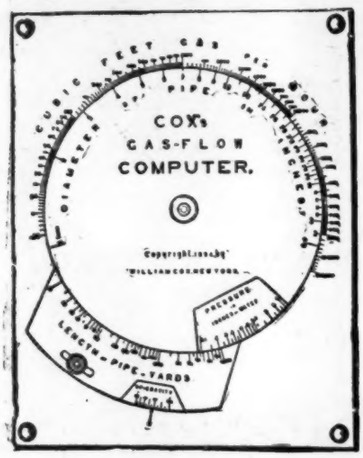

Do you wish to Know

what size of Pipe to use to convey any quantity of Gas, any distance, with any loss of pressure, and any initial or final pressure? Then use

COX'S GAS FLOW COMPUTER,

as it gives this information accurately at sight, without mental effort. No calculations needed. Saves time, money and mistakes.

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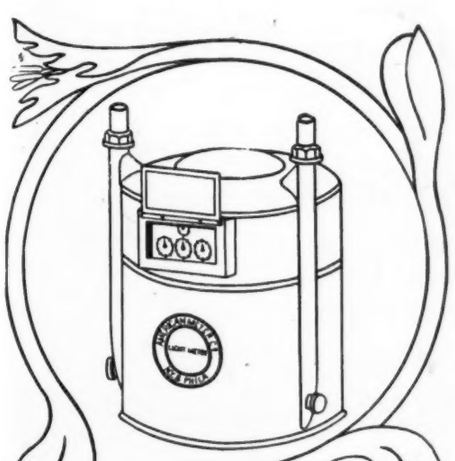
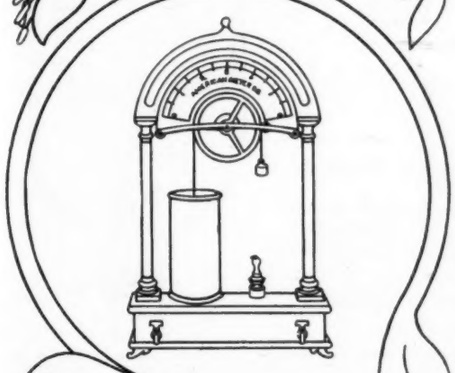
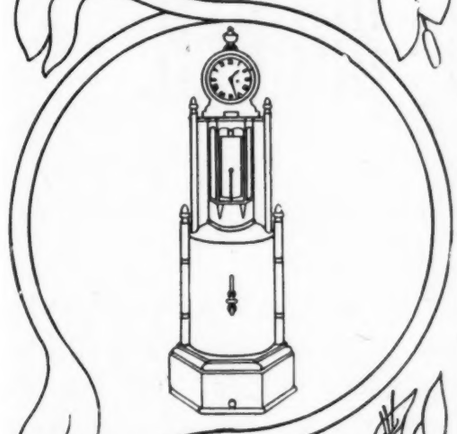
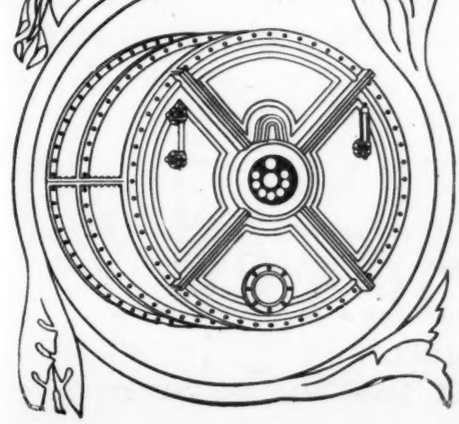








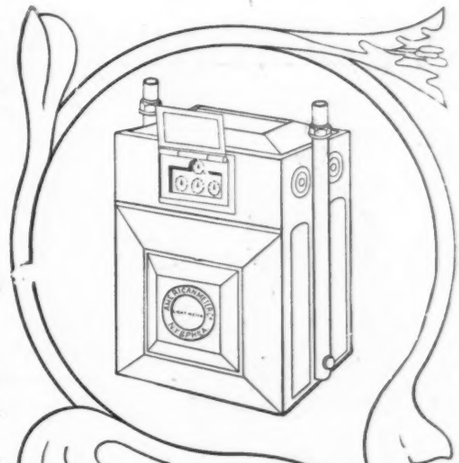
PUBLIC LIGHTING TABLE.

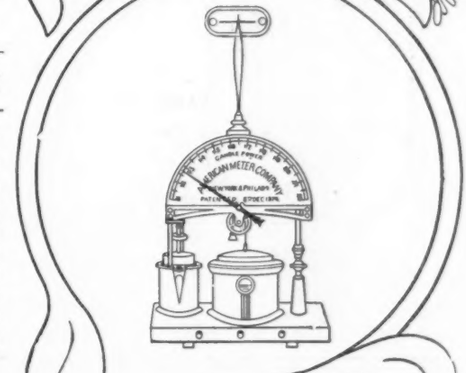
MARCH, 1902.

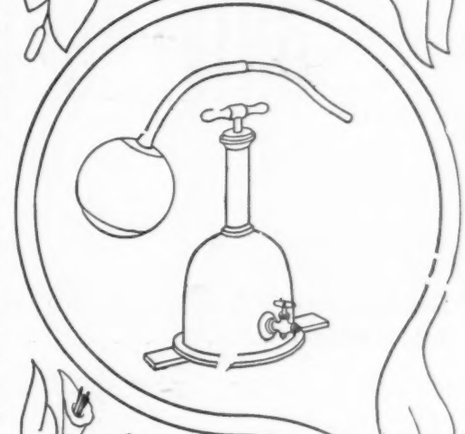
Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Sat.	1	6.20 PM LQ	2.00 AM	5.30	5.45
Sun.	2	6.30	2.50	5.30	5.45
Mon.	3	6.30	3.40	5.30	5.45
Tue.	4	6.30	4.20	5.30	5.45
Wed.	5	6.30	5.00	5.40	5.35
Thu.	6	6.30	5.30	5.40	5.35
Fri.	7	6.30	5.30	5.40	5.35
Sat.	8	6.30	5.30	5.40	5.35
Sun.	9	6.30 NM	5.20	5.40	5.35
Mon.	10	6.30	5.20	5.40	5.35
Tue.	11	6.30	5.20	5.40	5.35
Wed.	12	6.30	5.20	5.50	5.20
Thu.	13	6.30	5.20	5.50	5.20
Fri.	14	10.30	5.20	5.50	5.20
Sat.	15	11.40	5.20	5.50	5.20
Sun.	16	12.30 AM FQ	5.10	5.50	5.20
Mon.	17	1.20	5.10	5.50	5.20
Tue.	18	2.10	5.10	5.50	5.20
Wed.	19	2.50	5.10	6.00	5.10
Thu.	20	3.20	5.10	6.00	5.10
Fri.	21	4.00	5.10	6.00	5.10
Sat.	22	No L.	No L.	6.00	5.10
Sun.	23	No L. FM	No L.	6.00	5.10
Mon.	24	No L.	No L.	6.00	5.10
Tue.	25	6.50 PM	9.00 PM	6.00	5.10
Wed.	26	6.50	10.00	6.10	4.55
Thu.	27	6.50	11.00	6.10	4.55
Fri.	28	6.50	11.50	6.10	4.55
Sat.	29	6.50	12.40 AM	6.10	4.55
Sun.	30	6.50	1.30	6.10	4.55
Mon.	31	6.50 LQ	2.10	6.10	4.55

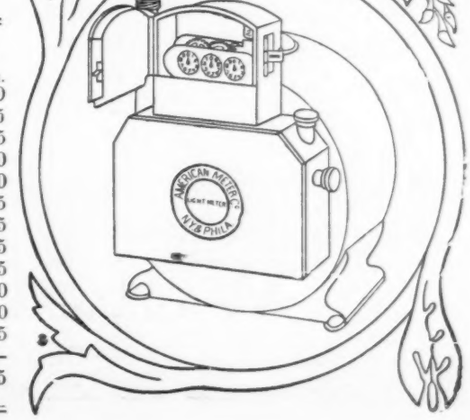
TOTAL HOURS LIGHTING DURING 1902.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	238.30	January	423.20
February	196.20	February	355.25
March	196.20	March	355.35
April	166.40	April	298.50
May	151.40	May	264.50
June	131.10	June	234.25
July	142.40	July	243.45
August	162.00	August	280.25
September	179.00	September	321.15
October	216.30	October	374.30
November	224.10	November	401.40
December	250.00	December	433.45
Total, yr.	2255.00	Total, yr.	3987.45





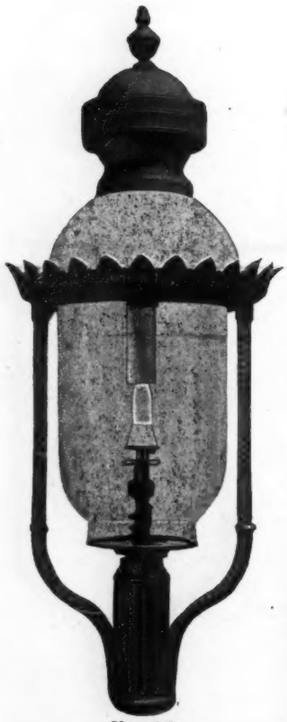




NEW YORK, 33 Nassau Street. PHILADELPHIA, Broad and Arch Streets. CHICAGO, Foot of Orleans Street. BOSTON, 624 Tremont Building.
CLEVELAND, 809 Cuyahoga Building. ST. LOUIS, 712 Roe Building. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 36.

Controls and Operates the

Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

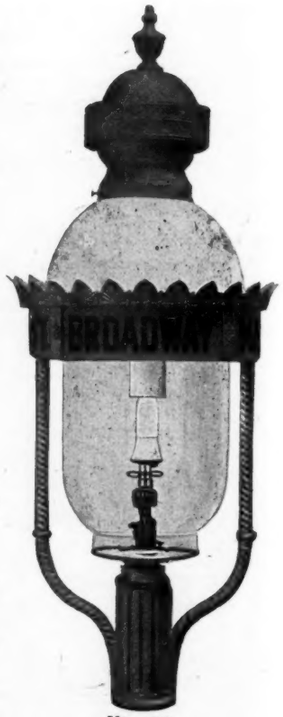
POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others Interested in Municipal and, Outside Lighting.



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UNIVERSAL WELSBACH BURNER.

The most practical, efficient and artistic burner yet produced. . . . . .

It contains an improved adjustable Bunsen so constructed as to permit of a wide range of variations in gas pressure without blackening the mantles and without an adjustable air shutter. . .

It can be used with all styles and sizes of glassware, either shades or globes. No further necessity to carry a stock of different burners for the many sizes and shapes of glassware.

GAS COMPANIES AND DEALERS CANNOT FAIL TO APPRECIATE THE MANY SALABLE FEATURES OF THIS NEW BURNER.

WELSBACH COMPANY,

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Salesrooms in all the Leading Cities of the United States.

THE STANDARD DOUBLE SUPERHEATER

LOWE WATER GAS APPARATUS.

The capacity of apparatus installed, if operated continuously, is sufficient to make more than the entire amount of artificial gas annually sold in the United States.

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Established 1858. Incorporated 1890.
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Established 1854. Incorporated 1869.

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Water Gas Cupola Linings, Fire Clay, Etc.

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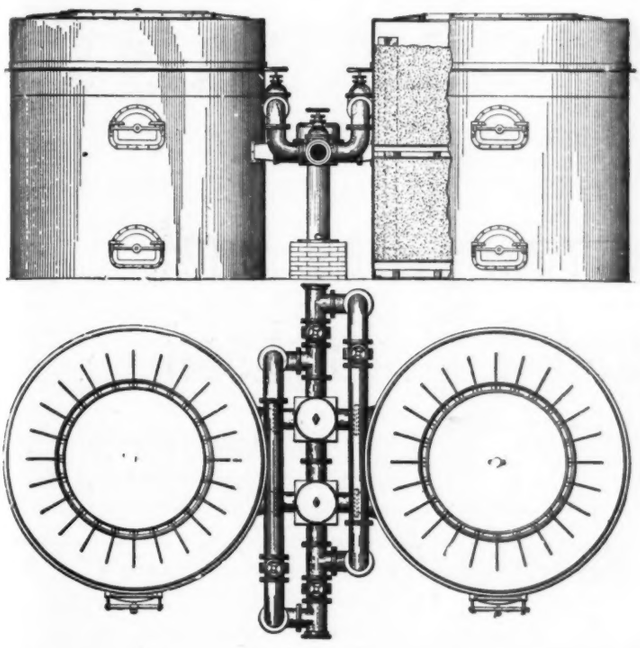

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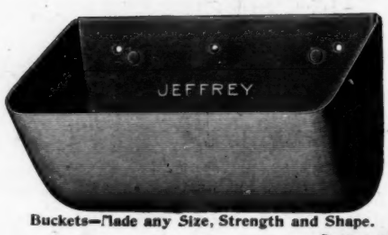

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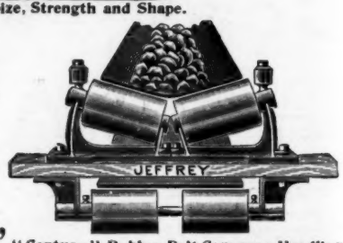

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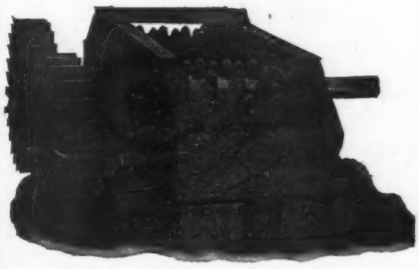

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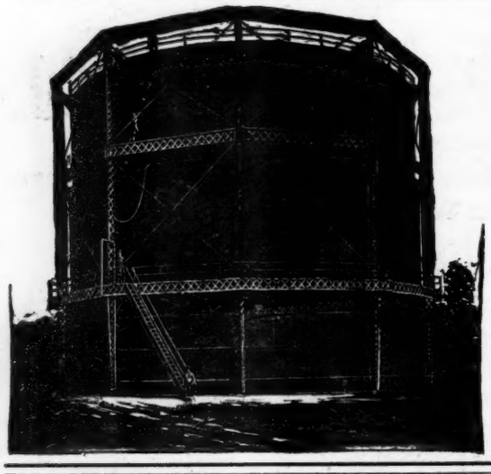

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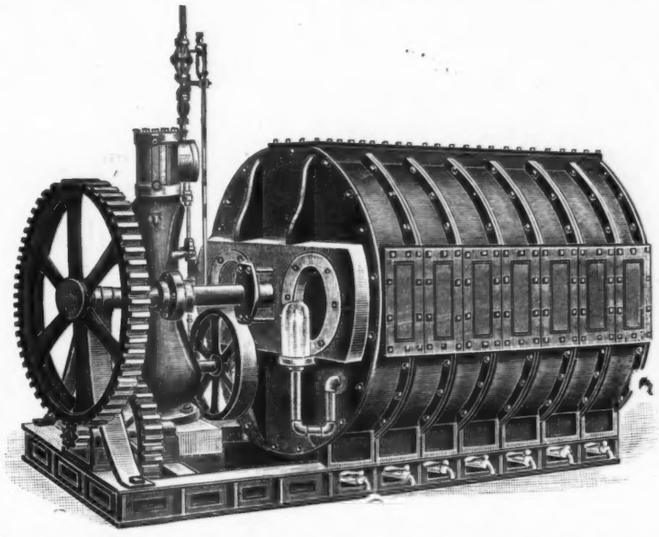

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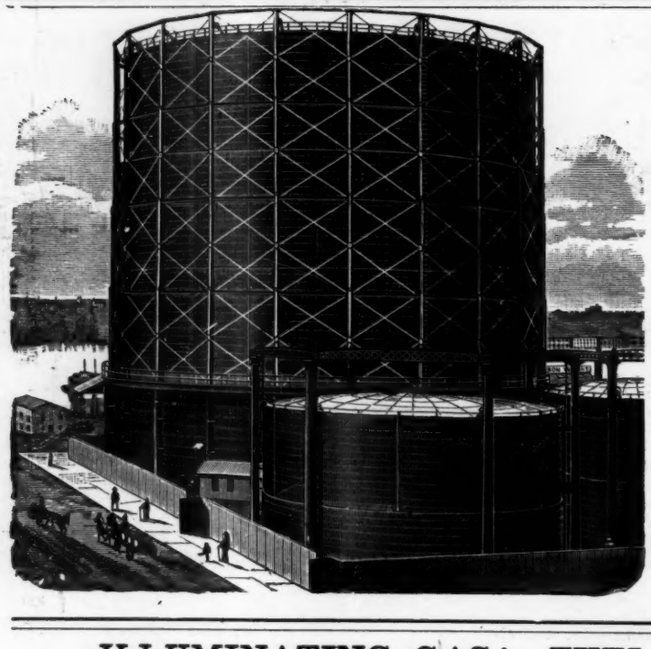

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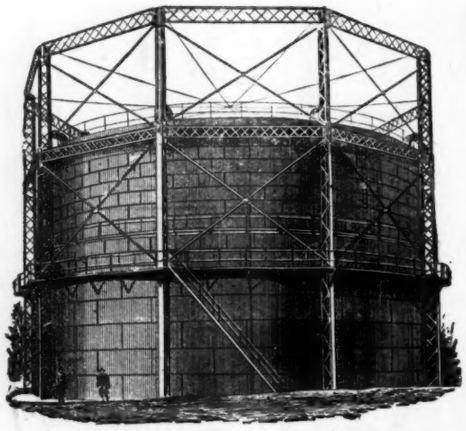

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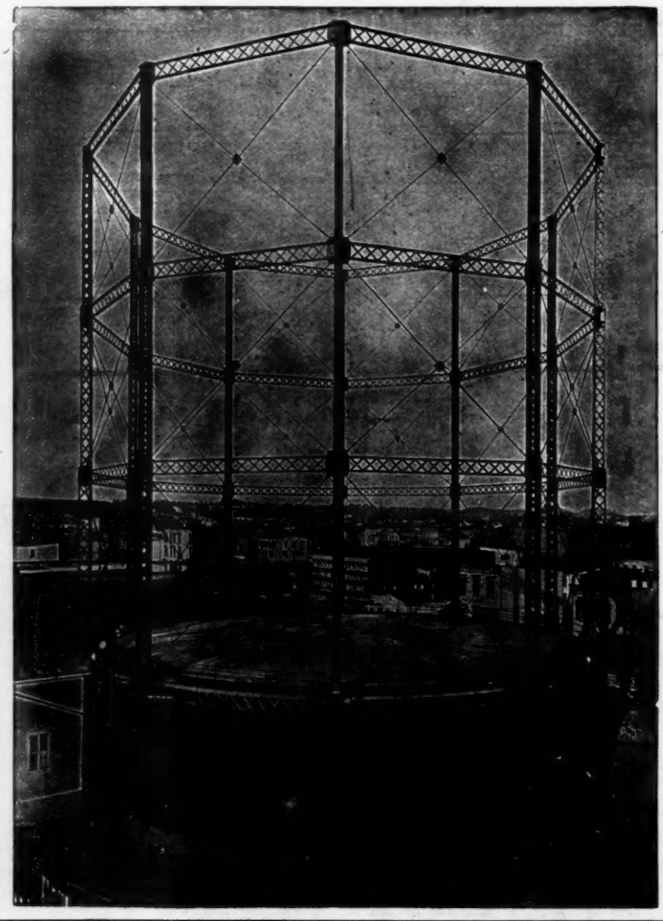

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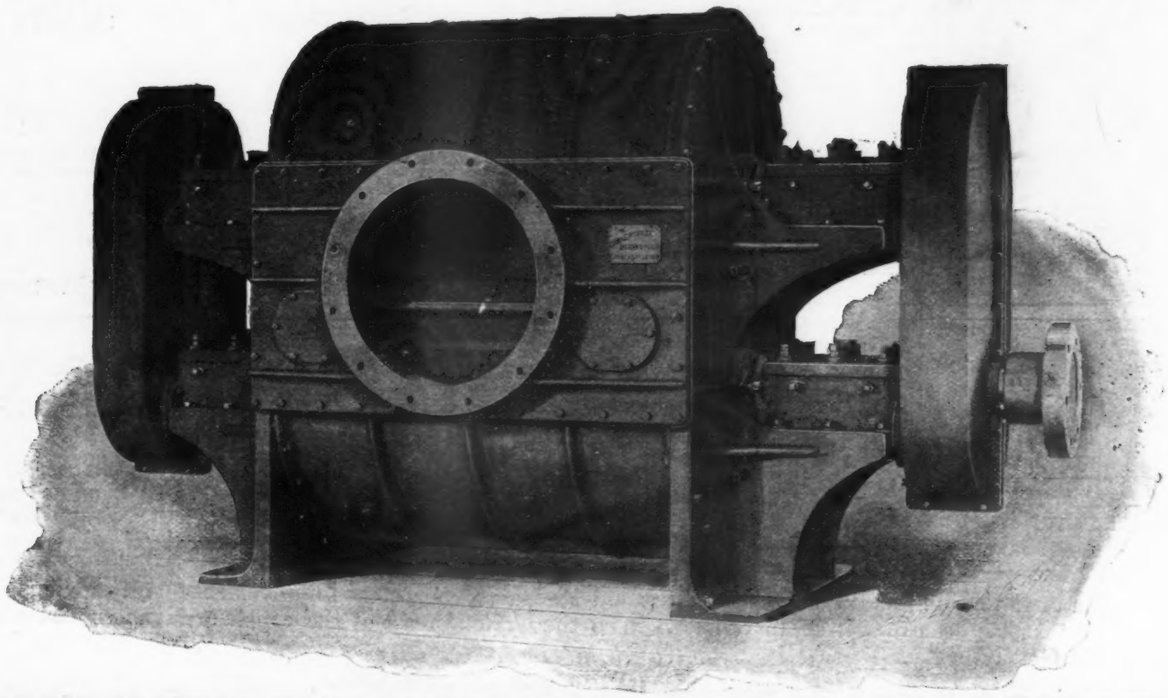

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